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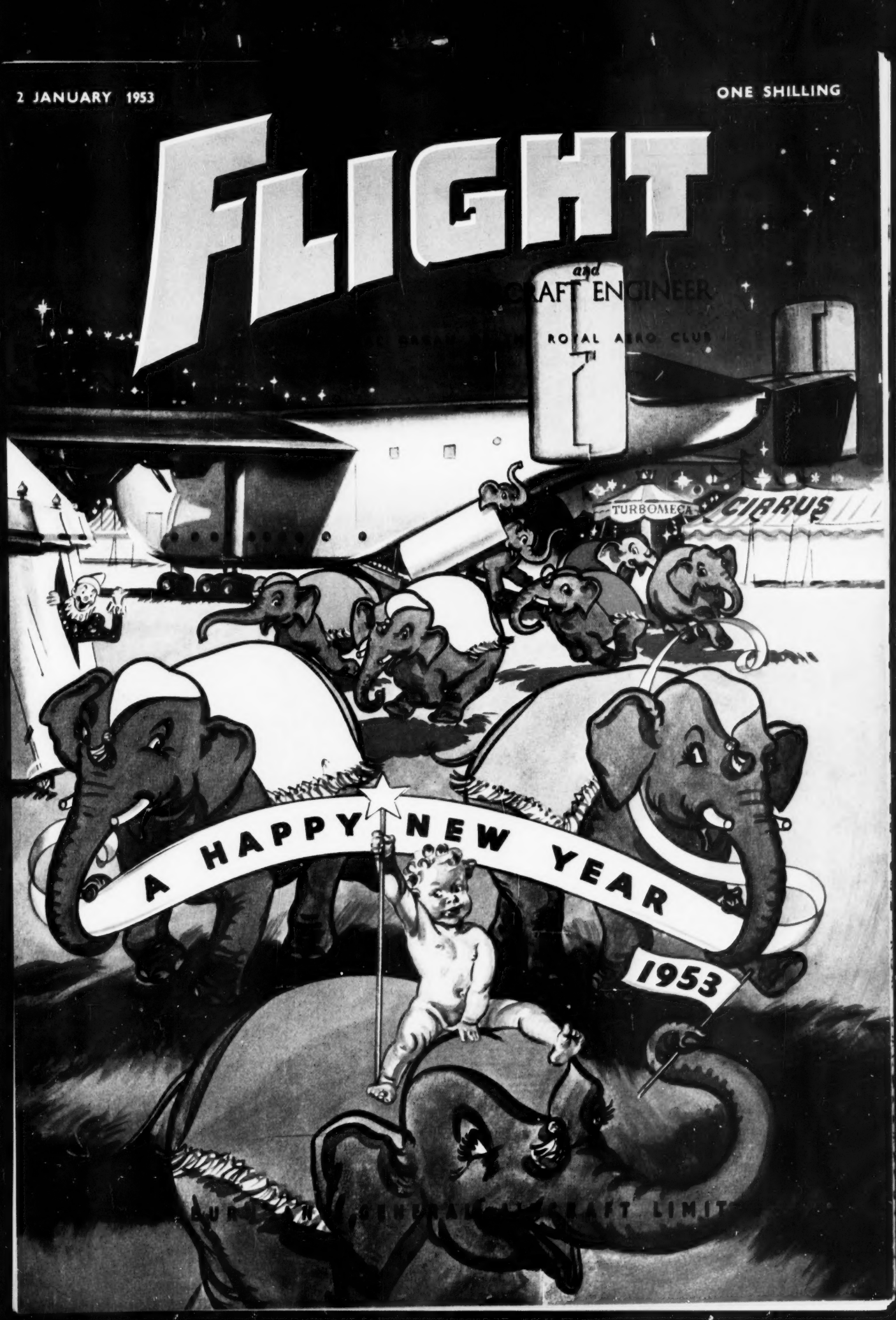

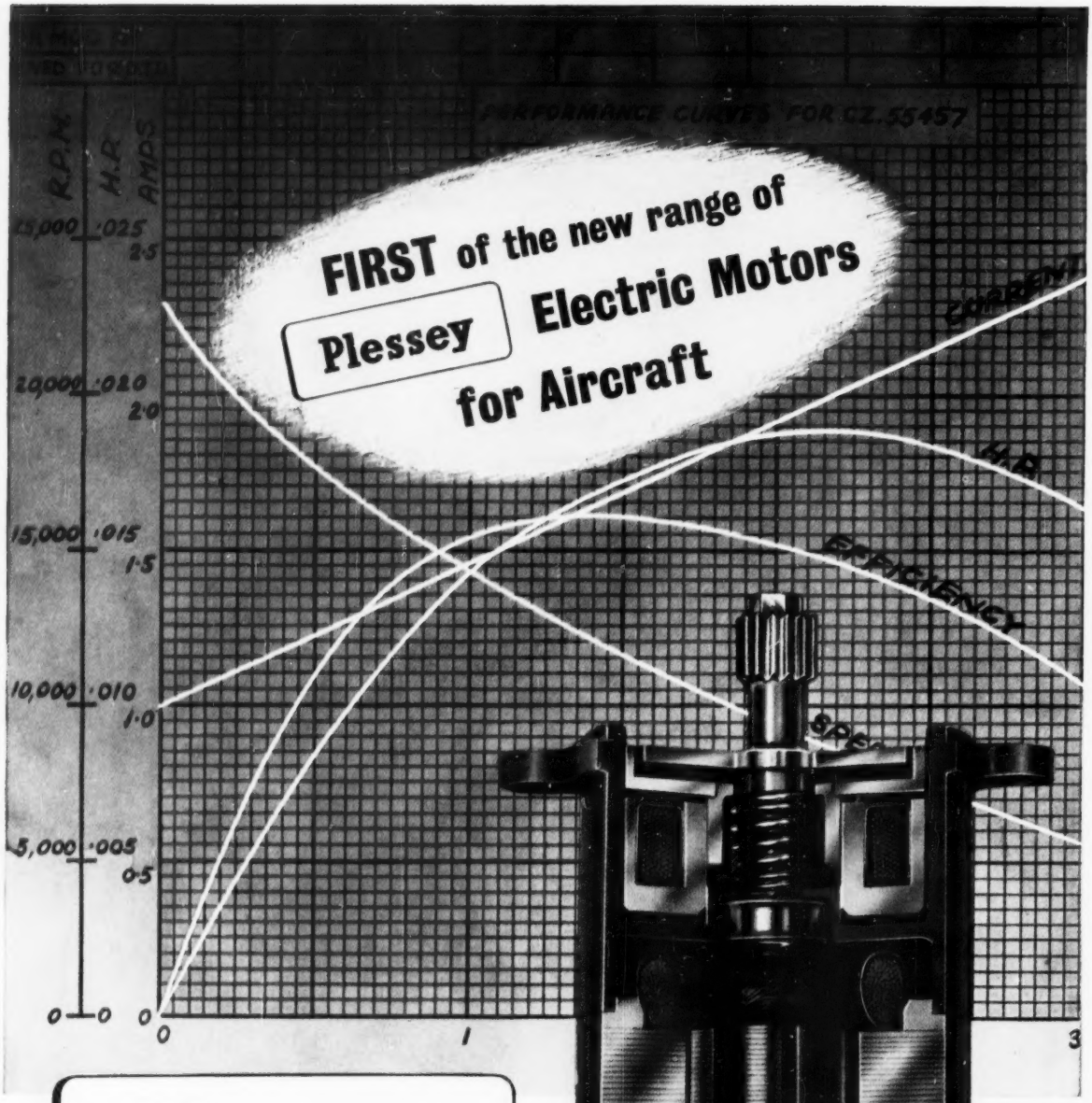

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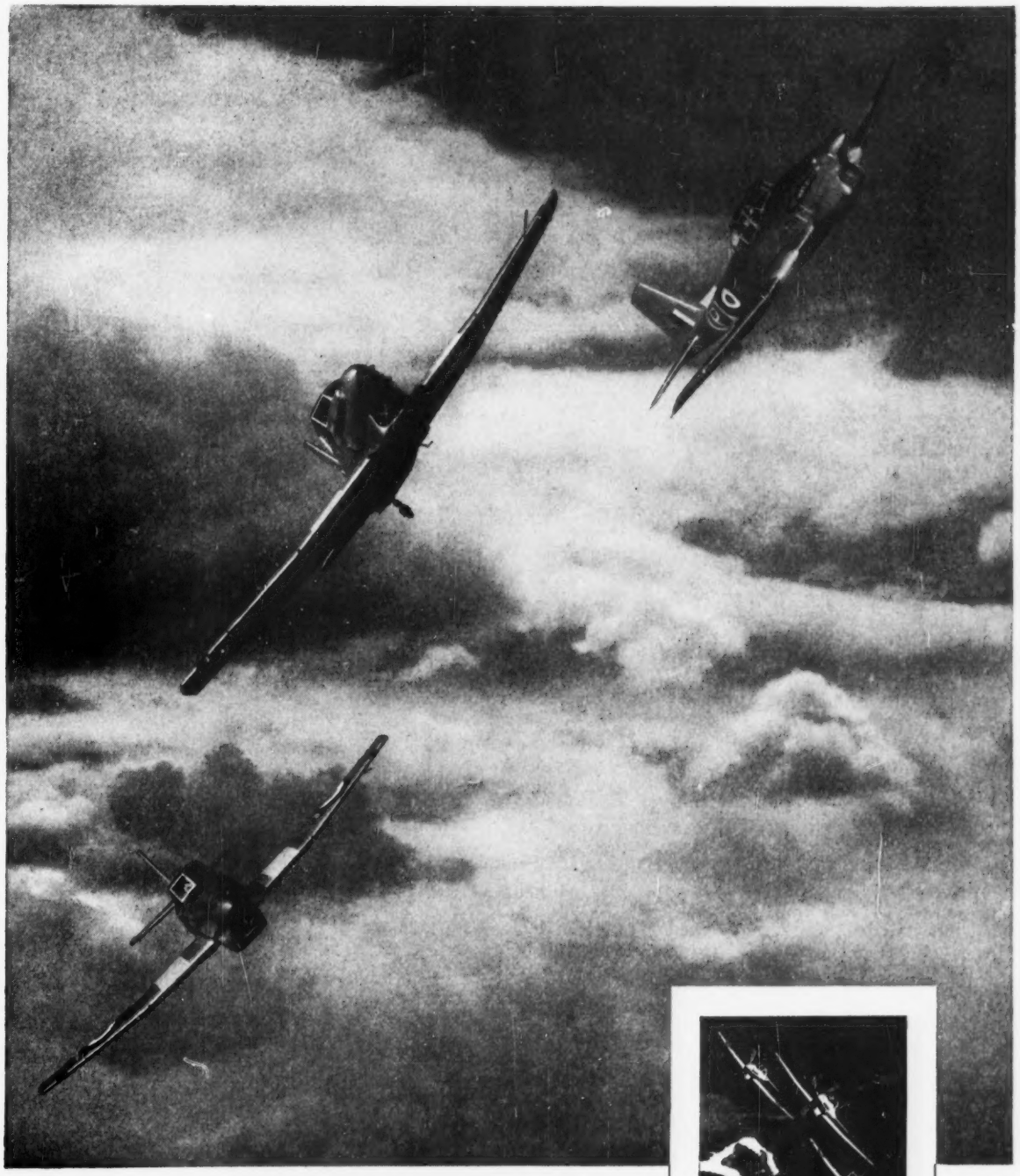

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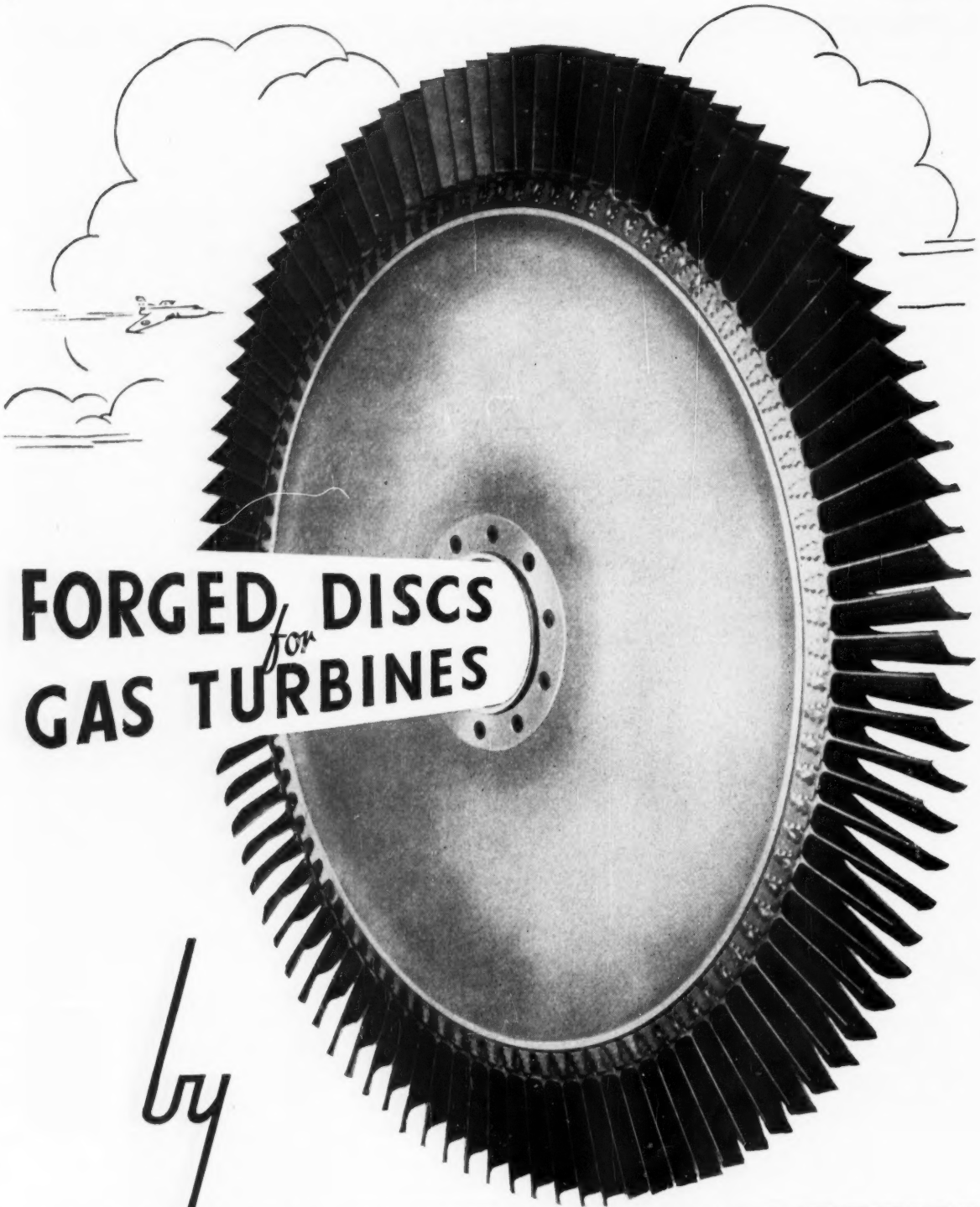

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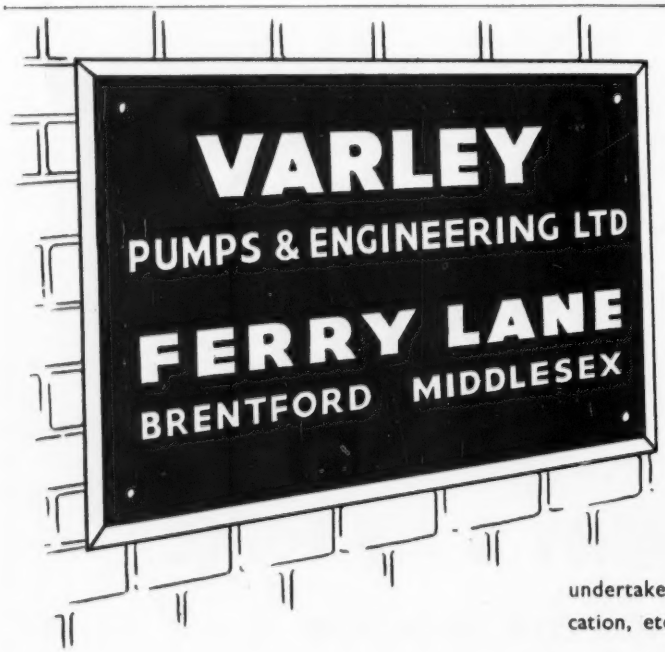

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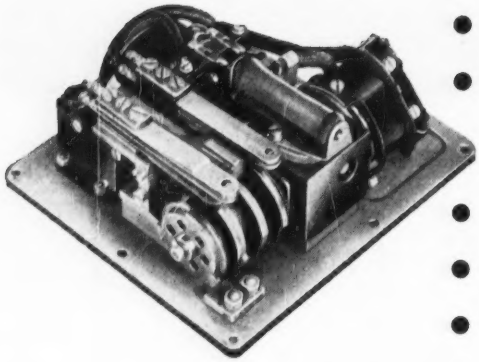

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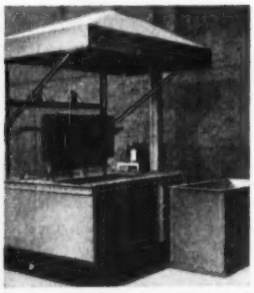

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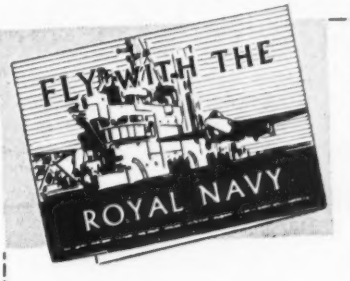

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EDITOR
MAURICE A. SMITH, D.F.C.

ASSISTANT EDITOR
H. F. KING, M.B.E.

ART EDITOR
JOHN YOXALL

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Dying Species?

TAKING the long-term view, there is reason to feel concern over the training of commercial pilots. The opportunities offered by air transportation are daily becoming more widely recognized and as a nation we have made a remarkably good start with the new generation of airliners. On the operational side there is some lack of balance and the effects of discrimination linger on, but we have cause to be very proud of our Overseas and European airline Corporations. Now, when almost unlimited expansion can be foreseen—with room for all responsible operators—it would be nothing short of disastrous if lack of training facilities for the skippers to fly the aircraft, and to lead the crews of five or ten years from now, were to prevent the country from playing its full part in international air commerce.

The Royal example will undoubtedly inspire many more to seek ways and means of answering the call of the air. Where should commercial pilots come from? Obviously there will be no flow from among private individuals who learn to fly at their own expense. Unfortunately, this also means that there is no way in which a young man can realize a desire to make the air his career unless he is prepared to enlist in the Services or has very considerable means at his disposal. We may add that there is no school at all for private-pilot training on rotorplanes.

There remain two principal alternatives. To continue to look to the R.A.F. for pilots, or to train commercial pilots at the public expense. The first course offers great possibilities but not perhaps along the present rather casual lines. Moreover, recent changes in plans for training pilots for the R.A.F. will have the result of reducing the numbers likely to be available for commercial flying later on. (Unfortunately, also, it will almost certainly have the immediate result of the peremptory "demobilization" of a considerable number of experienced flying instructors.)

But this remedy may not in any case be a lasting one, because of the already foreseeable changes in the R.A.F.'s aircrew structure and requirements; even today the Service will naturally seek to retain the cream and release only pilots of average or mediocre ability. This is not an encouraging thought for civil operators.

On the other hand, a national college of flying training, supported by the State and by the operators, and with entry the subject of a competitive examination or scholarship, would seem to be an essential some time in the near future—and the sooner the better, we feel. Temporarily the aircrew position is fairly static. Provision is being made for the steadily increasing numbers of passengers and more frequent services with the introduction of larger and faster aircraft—with the result that few, if any, more pilots are needed. There is a limit to this sort of expansion, however, and overall the situation grows slowly more serious, for qualified pilots cannot be created overnight however much money is made available at the eleventh hour. The great pool of experienced wartime pilots has seeped away, and many of the present airline captains are by no means young men.

Why have we heard so little of the scheme announced some twelve months ago whereby National Service pilots were to appear before a selection board with a view to acceptance for employment as commercial pilots upon their release? Once chosen, they were to have received special help and training to fit them for their civil employment while completing their R.A.F. service. As we commented in a leading article on September 28th, 1951, such a scheme for an all-through flying career would have been "advantageous to the military authorities, airline operators and candidates alike." We wonder, as well, if the present Ministers have re-read the Wilcock Report of February, 1950. It contained much that was arguable, but it also provided some background material worthy of consideration today.

It is unfortunate that shortages bring with them cumulative bad effects. During the summer before last the scarcity of aircrews resulted in a slight lowering of qualifications for acceptance and a raising of age limits. Such stopgap measures can result only in a lowering of status for the profession as a whole. Experiences confirm that the more difficult it is to enter, the more highly regarded a profession becomes; and, unexpectedly perhaps, the result is that better men in greater numbers seek to make it theirs.

AIRFLOW over MOUNTAINS

Reflections on Sometimes-dangerous Phenomena

By A. H. YATES

ON the evening of January 10th, 1952, a Dakota of Aer Lingus, *Saint Kevin*, crashed four miles downwind of Snowdon. The report of the public inquiry into the causes has been published, and the findings give the probable cause of the crash as "the encountering of a powerful down-current of air on the lee-side of Snowdon which forced the aircraft down into an area of very great turbulence . . ."

The whole question of up-currents and down-currents near mountains is one of great concern in aviation, because of the large number of accidents which have occurred even among the comparatively low hills of Great Britain. Some of these have been attributed to carelessness on the part of pilots who chose an inadequate safety-height and flew into the sides of hills. Many, however, occurred to pilots who had attempted to fly at the approved safety-height but who found exceptional down-currents which dragged their aircraft into the danger area.

How much is known about the strength of these currents? The answer is that the observations and theoretical work of meteorologists and pilots in the last 15 years has completely changed ideas on airflow over mountains, with the result that much new information can now be given.

First, let us recall the circumstances of the *Saint Kevin* crash and, in particular, the weather of January 10th. At nine o'clock that morning the meteorological officer at Liverpool gave the surface wind as "calm" but, only six miles above; the wind speed as revealed by the radar tracking of a balloon was 120 kt. This tremendous wind-shear reveals that it was an exceptional day, and confirmation is seen from the wind-speed records plotted in Fig. 1. It shows the upper air winds determined during the day at the three observation stations nearest to Snowdon. Early in the morning a jet stream at 30,000ft was blowing at about 150 kt from the W.N.W., but abated during the day. By evening the wind at 30,000ft was still about 100 kt and reached 60 kt at 5,000ft.

Although the dissipation of this high-speed jet of air must have been accompanied by considerable turbulence it was not such as to worry pilots on the Dublin-Northolt route except over the Welsh hills. Several pilots reported "quite rough turbulence" over the hills near Harlech on the Welsh coast, and the last words from the pilot of the *Saint Kevin* were "You'll find it pretty rough over the hills tonight. We were at four-five and went up to six-five. It seems to be right through." The temperature lapse-rate was normal, without inversions or isothermal layers and, although the night was cloudy, little icing was found.

The *Saint Kevin* left Northolt at 1725 hr G.M.T. for Dublin (Fig. 2) and, after flying along the Airway to Daventry, turned into the 60 kt headwind on course for Dublin. The course should have carried it some 15 miles south of Snowdon to reach the coast at the Nevin radio beacon but, owing to unexplained errors in navigation, the aircraft followed a track which took it directly towards Snowdon. An error in estimating ground speed was also made with the result that the captain thought he was progressing faster than he was.

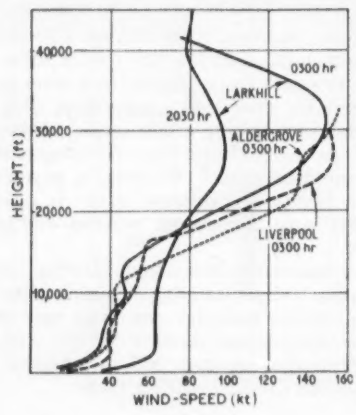


Fig. 1 (left). Wind-speeds on January 10th, 1952.

Figs. 3 and 4 (right). Aerodynamic flow over a ridge; and flow of stable air over the same ridge (wet adiabatic lapse-rate, wind 20 m/sec).

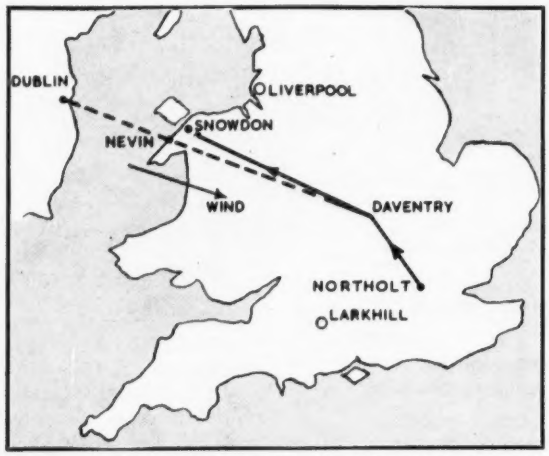
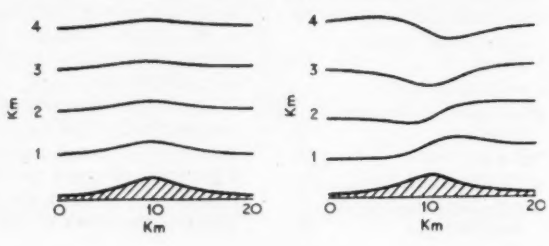


Fig. 2. Route of the "Saint Kevin" from Northolt to the location of the accident near Snowdon.

At 1854, when a reconstruction of the flight suggests that he had just reached the first Welsh hills, west of Oswestry, he sought and received permission to climb from his quadrantal height of 4,500ft to the next one at 6,500ft. No reason was given, but the fact that the request came on his arrival over the first hills suggests that rough air was the cause. After flying at 6,500ft for about 10 minutes the captain reported, erroneously, that he had reached the sea and requested a descent clearance (presumably to 4,500ft again, the lowest height permitted over the sea). By this time the *Saint Kevin* was probably about ten miles downwind of Snowdon, and it is suggested in the report that the aircraft, descending in air influenced by the mountains upwind, got out of control and crashed.

Standing Waves : Theory.—For an understanding of the disturbances in the atmosphere which can be caused by mountains beneath, we must turn to the evidence which has been collected in the last few years on atmospheric waves. The theoretical work has been well summarized by Scorer,[1] who points out that the "aerodynamic" airflow of a uniform stream across a long ridge, which occurs when the air has no static stability, is similar to that obtained in a wind tunnel at the appropriate Reynolds' Number.

When account is taken of a typical, stable atmospheric lapse-rate the flow is very different and the disturbance reaches much greater heights (Figs. 3 and 4). When, in addition, the speed of the wind approaching the hill increases with height, then Scorer has shown that a series of waves will form in the lee of the hill and that their influence will extend far downstream and to great heights. In the particular example which Scorer calculated (Fig. 5), a ridge 1,500ft high was producing down-currents of 1,000ft/min at



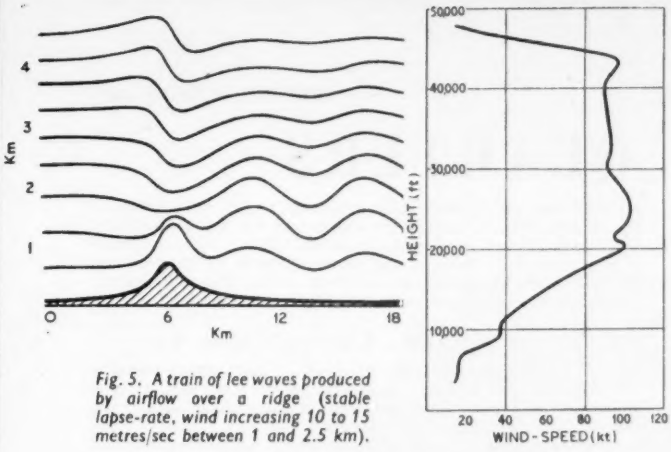


Fig. 5. A train of lee waves produced by airflow over a ridge (stable lapse-rate, wind increasing 10 to 15 metres/sec between 1 and 2.5 km).

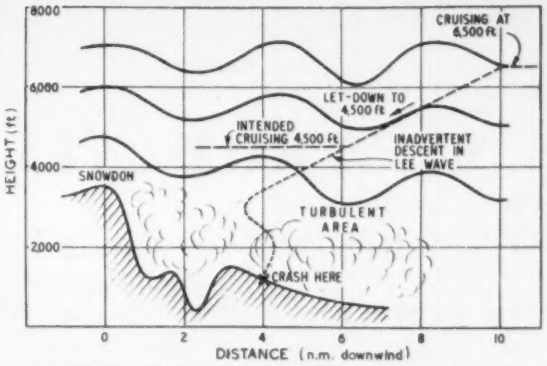


Fig. 6 (left). Wind-speeds during Kuettner's Californian flight.

Fig. 7. (above). Section downwind of Snowdon (vertical scale exaggerated); supposed conditions leading to "Saint Kevin" accident.

15,000ft above the ridge while, in the 20 kt wind at twice the height of the hill, there were periodic up-and-down currents in the lee of the hill of about 500ft/min. The wavelength was about four miles.

Standing Waves: Experiment.—The general pattern of the flow as calculated by Scorer agrees well with observations. These are of several kinds, but the most valuable have been the reports of glider pilots. A 500ft/min wave upcurrent is an embarrassment to an airline pilot, but is very welcome to a sailplane pilot, who explores it to find its extent and strength and then climbs in it as far as he can or dares.

In the waves in the lee of the Californian High Sierras climbs have been repeatedly made into the stratosphere—the highest to almost 45,000ft. On one occasion the pilot of a P-38 (Lightning), finding the airport obscured by a dust storm, used his knowledge of the waves to fly for 1½ hr *with both airscrews feathered.* During this period he climbed 15,000ft to 30,000ft—an eloquent testimony to the strength of the up-current. A brilliant description of a sailplane wave flight has been given by Kuettner [2]. He first climbed to 36,000ft and then flew 400 miles downwind in four hours, using the up-currents of several other waves of the sequence. The wind speeds existing on this day (March 19th, 1952) are shown in Fig. 6 and the wind-shear, which Scorer shows to be a decisive factor, was notable. Similar flights in the lee of high mountains have been made in Germany, France, Spain, Argentina and in many other countries.

The waves are no less real when they are produced by winds across the much smaller hills of Great Britain. Gliders have frequently reached 13,000ft to 15,000ft in England—at least five times the height of the hills producing the waves. Powered aircraft, which have less difficulty in being at the right place at the right time, have explored waves at heights of 25,000ft above Yorkshire [3] and at 32,000ft above Hampshire where the hills are scarcely 1,000ft high[4].

If the humidity conditions are suitable the wave crests are marked by lenticular clouds. Recent observations by Ludlam [5] have shown that cirrus clouds at 30,000ft over the Cotswolds are caused by vertical displacements due to the small hills below. In Alaska, "mother-of-pearl" clouds estimated to lie at a height of 95,000ft are also believed to be orographic (i.e. to be produced by the influence of the hills below). This evidence of the extensive influence of a hill is in contrast to the view frequently found in textbooks that the effect of a hill is confined to about three times its height. Further, the influence of the hill downstream is considerable: gliders have soared in ten successive waves downstream from the Pennines to the Lincolnshire coast, 70 miles away. Pilots of Wellingtons have described [6] how smooth, rising air currents of 750ft/min for 10-15 min have been encountered at 13,000ft near Newcastle, some 40 miles downwind of the Pennines.

The strength of the up-current has rarely exceeded 750ft/min in England, although Kuettner in California found up- and down-currents of over 2,000ft/min. Nevertheless the pilot of an aeroplane flying parallel to the wave crest and trimmed for level flight may well be disconcerted to find himself with a steady rate of climb or descent of even 750ft/min. A surprising characteristic of this "wave air" is that it is often very smooth, and, as a result, a pilot trimmed to cross hills with 1,000ft clearance might descend in one minute to a dangerous height without receiving any warning from the turbulence of the air. The turbulence in other parts of the wave system may, however, be very severe. Kuettner describes how "the towplane banked vertically . . . disappeared completely from sight . . ." and how "the nylon tow-rope coiled towards the sailplane like a lassoo."

This extreme turbulence has been found in several well-known systems of standing waves.

Comments on the "Saint Kevin" Crash.—In the light of this accumulation of knowledge it is possible to guess the fate of the *Saint Kevin.* The last message indicated that the captain began to let down from 6,500ft in the belief that he was over the Irish Sea. In fact, he was about ten miles downwind of Snowdon in meteorological conditions favouring the setting up of powerful lee waves. The lower quadrantal height of 4,500ft clears Snowdon by less than 1,000ft and, if reaching this height was coincident with a severe downcurrent from the lee wave, the *Saint Kevin* may easily have been drawn into the eddy system associated with the mountain (Fig. 7). The pilots, thinking that they were now over the sea, would not be expecting violent turbulence; and it appears that they lost control of the aircraft which then shed part of a wing just before diving into the ground 1,200ft above sea level.

Among the recommendations of the assessors after the inquiry were (a) "The safety-height for stages of an air route which cross mountain ranges should be related to the meteorological as well as orographic data. This means that, on occasions when the meteorological forecast indicates that strong winds will be encountered at the approaches to and over the range, the safety-height (which is usually 1,000ft above the contours) should be increased. . . ."; (b) "Investigations should be made of the vertical currents in airstreams of high velocity and differing degrees of stability crossing mountain ranges so that the resulting data may be applied to the establishment of safety heights on regular air routes crossing such ranges."

Further Action.—A safety-height of 1,000ft above the mountain tops, which was until recently accepted even for much higher ground, is clearly inadequate in the light of the present knowledge of airflow over mountains. It is also to be hoped that pilots will inform themselves as much as possible of the results of the researches outlined above. There is no information yet of the intentions of the Government regarding recommendation (b) above, but it is noteworthy that the U.S. Navy (!) have sponsored the considerable research in America into the behaviour of mountain-lee waves and have decided to use gliders as their tools. These are fitted with oxygen and radio and, because of their great strength, ability to fly at low speeds and accurately known performance, are able to collect invaluable data.

Great Britain is well to the fore in the relevant theoretical work, and sailplane pilots have made hundreds of flights in these waves, but without any Government encouragement or financial support. Surely, here is an opportunity to help skilled amateurs to collect further data on this lesser-known but important aspect of air safety.

REFERENCES.

1. Airflow Over Mountains, *Science Progress*, No. 159, July, 1952. 2. *The Sailplane and the Glider*, November, 1952. 3. Mallett, *Gliding*, Winter, 1951-2. 4. Austin, *Weather*, February, 1952. 5. *Weather*, October, 1952. 6. *The Meteorological Magazine*, May and November 1952.

FROM ALL QUARTERS

Civil Super-priorities

ON Monday last the Minister of Supply, Mr. Duncan Sandys, announced that super-priority had been accorded to five more British aircraft. They are the Avro Vulcan and Handley Page H.P.80 medium bombers, and the de Havilland Comet, Vickers-Armstrongs Viscount and Bristol Britannia airliners. Mr. Sandys added that the extension of the super-priority scheme to back up the export drive emphasized the Government's determination to take the fullest advantage of Britain's remarkable technical lead in the civil transport field over all other countries. "We must be quick off the mark," he said.

The Minister concluded his announcement with the statement that super-priority had proved its worth in many ways, particularly in respect of the supply of special alloys, which were being received by designated manufacturers six to twelve months earlier than would otherwise have been the case.

The H.P.80 Flies

ON Christmas Eve the great new Handley Page bomber, type-numbered H.P.80 and provisionally named Victor, made a successful first flight at Boscombe Down. At the controls was Handley Page's chief test pilot, S/L. H. G. Hazelden, and with him was Mr. I. K. Bennett, the company's chief flight test observer. S/L. Hazelden reported that the aircraft handled beautifully and did not give a moment's anxiety.

The power plant consists of four Armstrong Siddeley Sapphire turbojets of undisclosed series and thrust.

A production order was placed some months ago for the new bomber, which is characterized by a crescent-shaped wing, and is described by Mr. R. S. Stafford, Handley Page's chief designer, as "the complete and only answer to the demands of a most exacting specification." This called not only for operation at high sub-sonic speed at very great heights over long ranges, but also good control over the whole speed range, particularly at approach and landing.

The two main undercarriages, each with four double-tyred wheels, spread the weight of the aircraft over a large ground area and permit operation from airfields with runways of normal strength.

Sir Frederick Handley Page, whose company has been supplying heavy bombers to the British fighting Services since 1916, described the maiden flight as "the climax of an inspired concept, brilliant research and years of very hard work." He hoped to see further proof of the new bomber's qualities when the new Handley Page intercontinental jetliner, the H.P.97, appeared. A. Cdre. A. V. Harvey, deputy chairman, paid a tribute to the Air Ministry and Ministry of Supply for their clear specification of very stringent requirements and for their encouragement of, and confidence in, the Handley Page Company's research and development ability.

As we go to press, it is learned that the H.P.80 is likely to remain at Boscombe for a brief period before flying to the makers' airfield at Radlett to continue its test programme. The main Radlett runway has recently been extended to over 2,100 yards.

The Flying Schools: Unhappy New Year

THE Government decision to close 16 basic flying-training, navigation and Reserve schools (as recorded on page 25) was the subject of a statement issued over the Christmas holiday by the British Air Line Pilots Association.

After explaining the method by which the schools are operated by civil contractors, the statement goes on to say that the pilots are employed on a monthly basis at a salary ranging generally from £750 to £1,050. These figures were recently the subject of an award by the Industrial Disputes Tribunal following an application by B.A.L.P.A.; they had previously been much lower. Almost all the pilots had served with the R.A.F. during the war on operational and instructional flying. The statement continues:—

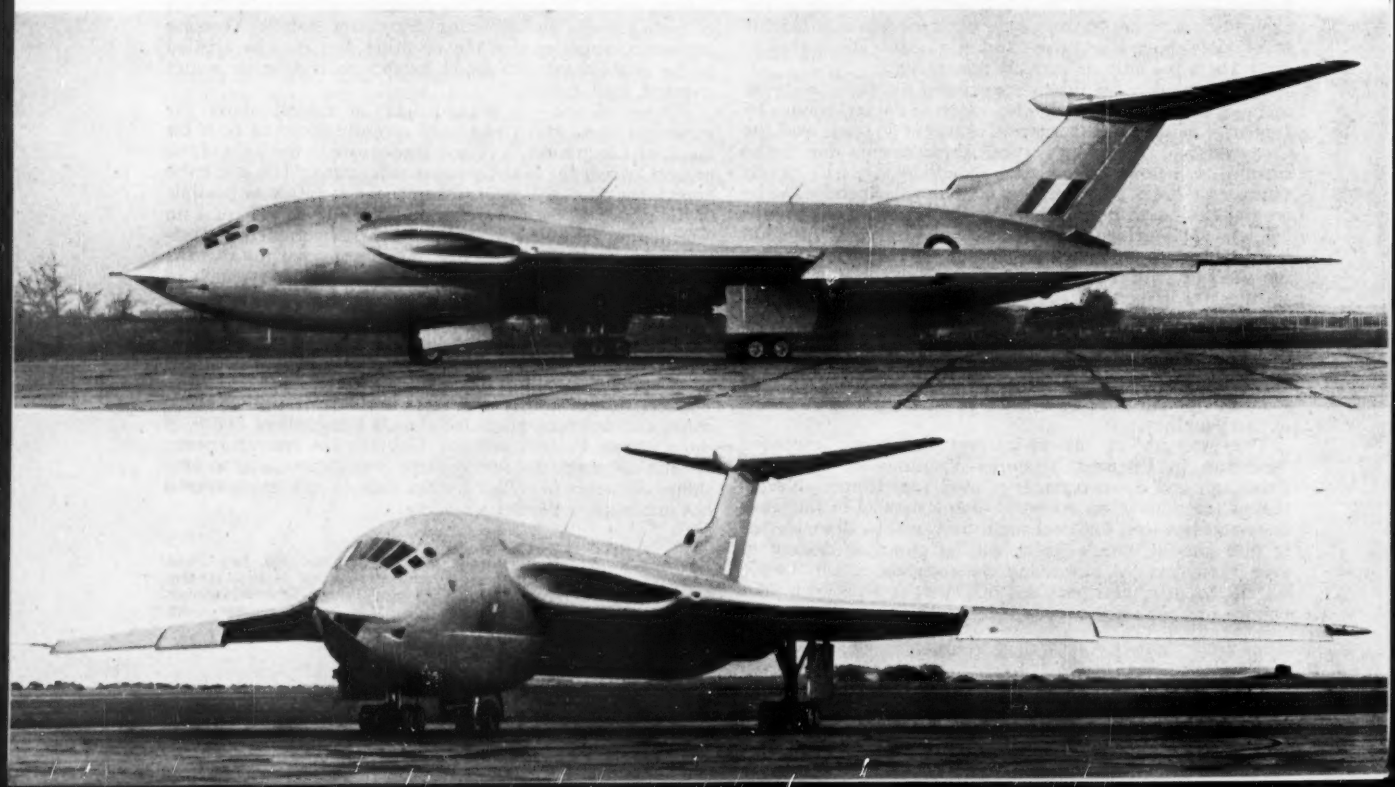
It is these men, who served their country in fair weather and in foul, for an average of some ten years, that the Nation is now, by a stroke of the pen, relegating to the ranks of the appointments boards and employment exchanges. It is relegating them with thanks, but not with pensions . . .

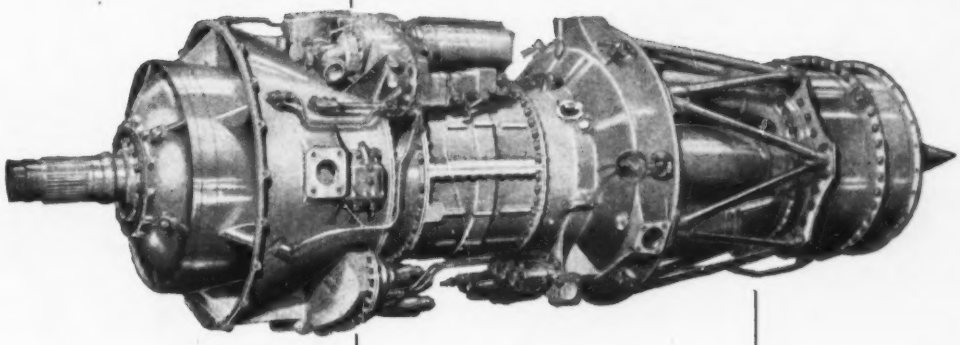
What can be done about it? This Association . . . knows that the Air Council was most reluctant to take the step it has taken. But in a case such as this sympathy is not enough. It was only a few months ago that the Air Council authorized the establishment of new schools; in order to staff them with instructors the operating companies persuaded men to leave secure and pensionable employment as teachers, civil servants, and so forth by inducements of a higher salary and the implied prospects of permanent employment. Here, clearly, the operating companies were acting in good faith; the responsibility for such a complete reversal of policy must, therefore, lie at the feet of the Air Council and the Government . . .

What answer can they give? First of all, it is known that there is a shortage of instructors in the R.A.F. itself. Pilots with the required instructional qualifications could be offered some straightforward avenue back into the R.A.F. Others, who have no instructional qualifications, but who have been employed as staff pilots at navigational training schools, could similarly be absorbed back into the R.A.F., where they could be employed in communcations duties, so releasing the younger pilots for operational work. Of the 300 pilots affected, perhaps some 150 could be absorbed this way.

Others, though fit for civil employment, may be regarded as unfit for the very different Service flying which they might be called on to undertake; moreover, some, at the age of forty upwards, may be unwilling to accept the domestic upheaval which re-enlisting usually entails. Yet to these older pilots, many of whom have given twenty years of their lives to serving their country, public responsibility is surely no less. Should

SAPPHIRE-STUDDED SCIMITAR: The "scimitar" or "crescent" wing of the Handley Page H.P.80 (four Armstrong Siddeley Sapphires) has leading-edge flaps. Also seen is the multi-wheel Electro-Hydraulics undercarriage, the unusual horizontal tail surfaces, and the fins on the tail cone.





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CONGRATULATIONS! Our readers will join with us in respectfully offering our warmest felicitations to H.R.H. the Duke of Edinburgh on his first solo, successfully completed on December 20th at White Waltham. He flew for about 15 minutes in poor visibility under a 1,000-ft cloud-base. The aircraft was a de Havilland Chipmunk, on which the Duke has been receiving instruction from F/L. C. R. Gordon, seen with him in this picture.

FROM ALL QUARTERS . . .

the Nation discard them? It could. It would, however, have this on its conscience: it has employed them on para-military duties as civilians, since by so doing the training was cheaper than if it were performed in the R.A.F.; it has side-stepped from any pension responsibility by employing them in the name of civil contractors and it has left it to those contractors to provide pensions, or not, as they thought fit . . . These pilots . . . deserve at least the compensation (either pension or gratuity) to which R.A.F. employment would have entitled them.

The solution therefore proposed by B.A.L.P.A. is that those civil instructors declared redundant should be offered the choice of: (1) returning to the R.A.F. under special arrangements; or (2) being granted compensation at rates at least as favourable as they would have received if they had been employed directly in the R.A.F.

Gannets for Australia

THE Fairey company's annual Christmas party in London on December 22nd was brighter even than usual, for it coincided with the announcement, synchronized in England and Australia, that the Royal Australian Navy had placed an order for 40 Gannets (Armstrong Siddeley Double Mamba turboprop) at a cost of £3,200,000. Deliveries will be made in 1955. Of the 40 machines 37 will be used for anti-submarine work and three for training.

The Gannet order follows extensive Australian experience with Fireflies—particularly those which form part of the complement of H.M.A.S. *Sydney* in Korean waters.

Production Conference

SOUTHAMPTON was the venue for a "Problems of Aircraft Production" conference held on December 19th and 20th by the Institution of Production Engineers. The papers presented were as follows: *Designing for Production*, two papers, by R. W. Walker, F.R.Ae.S., chief designer, Gloster Aircraft Co., Ltd. and Dr. A. E. Russell, D.Sc., F.R.Ae.S., F.I.Ae.S., chief aircraft designer, Bristol Aeroplane Co., Ltd.; *Prototype to Production*, two papers, by C. E. Fielding, O.B.E., A.F.R.Ae.S., M.I.Prod.E., works director, A. V. Roe, Ltd. and H. Povey, A.F.R.Ae.S., works director, de Havilland Aircraft Co., Ltd.; and *The Impact of Modifications on Production* by T. Gilbertson, M.I.Prod.E., director and general manager, Folland Aircraft, Ltd. Each of these papers will be summarized in our next issue, together with the chief points raised by the various chairmen and during the discussions.

A Handley Page Gathering

THERE was no doubt at all that everyone very much enjoyed the senior staff dinner of Handley Page, Ltd., which took place at the Café Royal, London, on December 23rd. A. Cdre A. V. Harvey, proposing "The Company," mentioned the earliest days of Handley Page at Barking, and said that it was the first limited-liability company to be devoted solely to aircraft construction. He went on to say that money expended wisely on aircraft was a good form of defence investment. With 300 or 400 jet bombers "and the right things inside them," there would be no more war.

There might not be such tremendous future in the civil aviation field as some people suggested, said A. Cdre. Harvey, but the future was big enough for the right aeroplanes. He added that we did not charge enough royalties for the jet licences we granted. In conclusion, he affirmed his faith in the future of the aircraft industry: in thirty years' time certain industries important now might not exist, but aviation, he felt sure, would continue to increase its contribution towards the nation's prosperity.

Sir Frederick Handley Page, presiding, first paid tribute to his staff, and then went on to speak of British aircraft. It was, he said, much better to have quality than quantity, and that this nation could not compete in numbers with Iron Curtain countries or with United States domestic markets. Referring to the "great deal of technical development ahead," he said that some things would revolutionize design in the future. He mentioned the suction wing, saying that it was possible to reduce drag to one-tenth by comparison with the figure today.

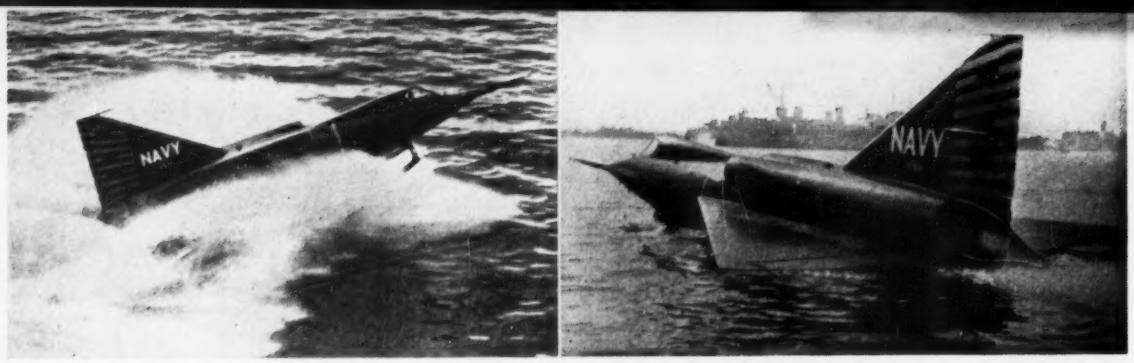
Coltishall Christmas

FEW stations are happier than Coltishall, Norfolk, where two famous night-fighter squadrons are based. We recently enjoyed a most convivial week-end on the station, where we incidentally heard something of how the Service has taken to the Meteor NF 11 and the Vampire NF 10. The Meteor unit, commanded by S/L. R. K. Bailey, is the proud possessor of an unusually fine sterling-silver model of the NF 11 which has been presented to them by Sir W. G. Armstrong Whitworth Aircraft, Ltd., in honour of their having been the first jet night-fighter squadron of the Royal Air Force. The Vampire unit, under the command of S/L. A. J. Jacomb-Hood, D.F.C., engage in friendly rivalry with their faster, but more massive, companions. We hope that free discussion of these aircraft will soon be permitted.

P. G. Lawrence Joins Glosters

EQUALLY well known as test pilot and racing pilot, Peter Godfrey Lawrence, M.B.E., has joined the flight-test staff of the Gloster Aircraft Co., Ltd. Born in 1920, he entered the aircraft industry in 1937 as a Handley Page apprentice, and during the war served in the Fleet Air Arm. He began test-flying of naval aircraft in 1942, in the Service Trials Unit, and on demobilization in 1945 joined Blackburn Aircraft as an experimental test pilot. After taking the E.T.P.S. course he was appointed chief test pilot, and his M.B.E. was in recognition of his deck-landing trials of the Firebrand 4. From 1948 onwards, flying such varied aircraft as Firebrands, Proctors, and an old Blackburn B.2, he competed in most of the major air races, his successes including the Kemsley Trophy at Newcastle last summer. In June last he left Blackburn and General Aircraft and went as a test pilot to English Electric. He has some 3,000 hours on over 80 different types.

P. G. Lawrence.



SEA DART: So styled is Convair's unique XF2Y-1 hydro-ski fighter. Its lines suggest a speed well into the supersonic region, and it has plenty of power—two Pratt and Whitney J-57s of some 12,000 lb thrust apiece. This 60 deg delta-wing prototype is now undergoing initial taxying trials.

HERE AND THERE

Netherlands Air Display

TO celebrate the 40th birthday of Dutch military aviation, the Netherlands Air Force and Royal Netherlands Aero Club are to hold a NATO air display at Soesterberg on July 18th. As the Dutch find it impracticable to hold more than one international air show in the same year, the annual ILSY display is to be postponed until 1954.

R.N.Z.A.F. Recruiting in U.K.

READERS may be surprised to learn that nearly a quarter of the airmen and half of the airwomen serving on the ground staff of the Royal New Zealand Air Force are former members of the U.K. Armed Services. Since recruiting began in the U.K. in 1947, more than 840 men and 224 women have signed on with the R.N.Z.A.F.

The Paris Show

A GROUND-PLAN issued by the organizers of the 20th Paris Aeronautical Exhibition, to be held at Le Bourget Airport, shows that the arrangements bear a certain resemblance to those of the S.B.A.C. Farnborough Show. There will, for instance, be indoor and outdoor static shows, an aircraft park, and a public enclosure which will be sited near the north-south runway. The exhibition is from June 26th to July 5th, with flying displays on July 4th and 5th. Application for exhibition space should be made to the Union Syndicale des Industries Aéronautiques, 4, Rue Galilée, Paris 16e.

Mme. Auriol's Record

ON December 21st, in a Mistral (French-built Vampire development, with Hispano Nene) Mme. Jacqueline Auriol broke her own unofficial 100 km world speed record of 508.392 m.p.h. by flying at 855.920 km/hr (531.846 m.p.h.). The new record, which is subject to confirmation, was made over a course from Istres, outside Marseilles, to Avignon and back. Mme. Auriol, is the 34-year-old daughter-in-law of the French president.

Blackburn Director Retires

ON December 31st Mr. R. R. Rhodes, F.R.Ae.S., retired from the board of Blackburn and General Aircraft, Ltd., after thirty-six years with the company. Born in 1885, Reginald Rhodes joined Blackburns in February 1916 as an inspector in their original Olympia factory in Leeds. After a short time he was transferred to the newly opened Brough Works, where he was appointed manager. (At that period the company's G.P. and S.P. seaplanes were under development and later the well-known Kangaroo twin-engined commercial biplanes were produced.) Subsequently he became manager of the London office and was elected to the board in 1921. Ever since then he has worked in London and has become well-liked by the representatives of the Ministry and the Services with whom he has come in contact.

November Exports

THERE was a decrease of approximately £510,000 in the total value (£3,304,693) of aircraft and aircraft parts (with the exception of magnetos, tyres and tubes) exported from this country during November, compared with that for the corresponding month last year. However, the value of such exports for the eleven-month period ended November 30th was £38,946,091 — some £915,000 more than in the comparable period last year.

The Globemaster Crash

FOLLOWING the take-off accident to a C-124 Globemaster at Moses Lake on December 21st, in which 86 Servicemen lost their lives, several Congressmen have pressed for the grounding of the type. They express themselves seriously concerned at the mounting toll of accidents to large Service aircraft; nine, during an unstated but comparatively recent period, have accounted for 300 lives. A prompt preliminary report on the C-124 crash showed the cause to have been locked controls; a master lock had been released sufficiently to free the throttles, but not the flying controls.

Memorial Fund Benefits Students

A $20,000 bursary fund to assist aeronautical engineering students has been made available to the University of Toronto. It has been established by the Babb Company (Canada), Ltd., of Montreal, in memory of one of their pilots, J. L. Harrison, who lost his life in 1948 while on flying duty. The company received $25,000 in insurance and decided to devote the proceeds to a life annuity for the pilot's widowed mother. On her death any funds remaining were to go to the University

Douglas A3D (above) and Grumman S2F-1.

Midnight-Blue Newcomers

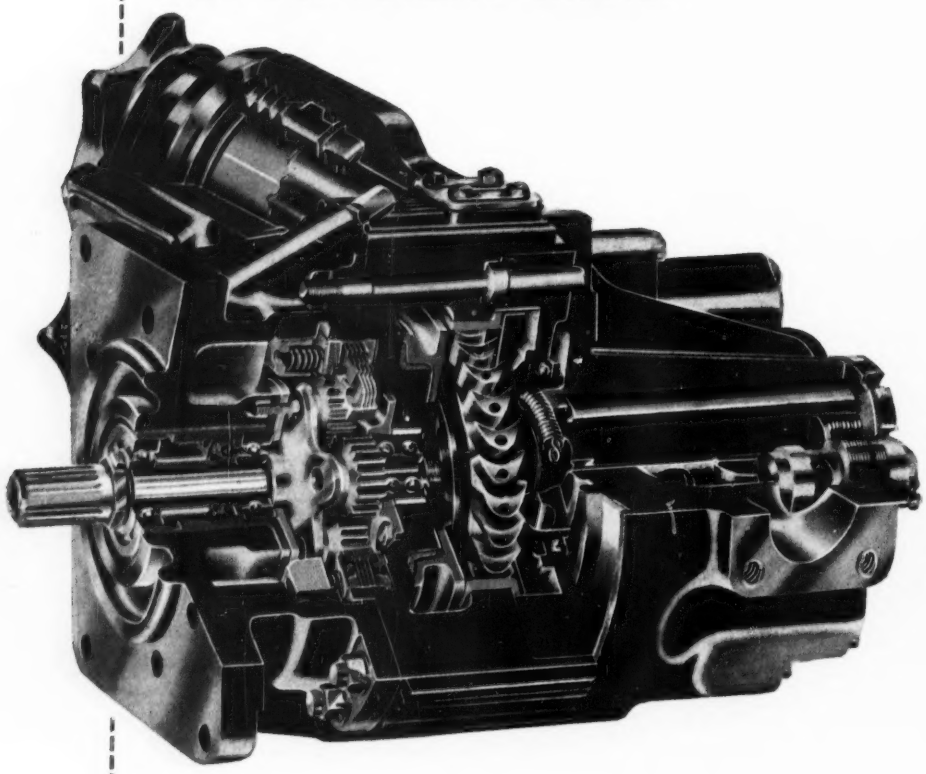
TWO very different U.S. Navy twin engined aircraft are now carrying out initial flight testing. The Douglas A3D is a very fast carrier-based bomber powered by a pair of Pratt and Whitney J-57 split-compressor turbojets. Equipped for flight refuelling it can, it is claimed, carry "a bigger load farther than any other aircraft of its size." The other is Grumman's S2F-1, a carrier-based anti-submarine aircraft; powered by two Wright Cyclone R-1820s, it fills both search and strike rôles.

THE VICKERS VALIANT

The first four-jet bomber to be ordered by the R.A.F.

A TURBO-STARTER

FOR GAS TURBINE ENGINES



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* Self-contained multi-breech with no rotating parts.
* Should engine fail to start, another attempt may be made after 15 seconds.
* Overload clutch allows re-engagement into engine running at low speed.
* Overspeed device controls speed if re-engaged into engine running at high speed.
* Excess pressure relief valve.
* Electrically fired cartridges cannot be ignited until breeches are locked.
* Gear box oil lubricated from engine system.
* Five hundred operations between overhaul.

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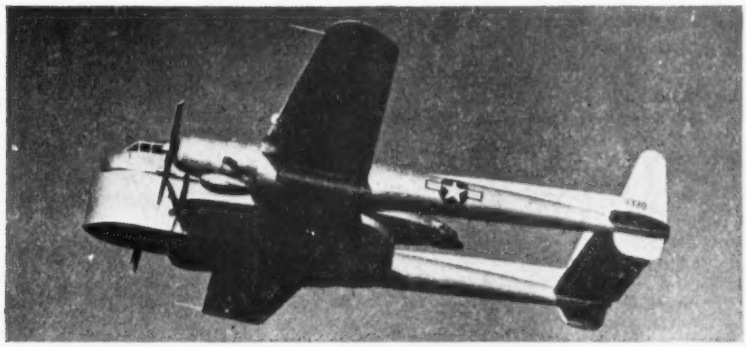
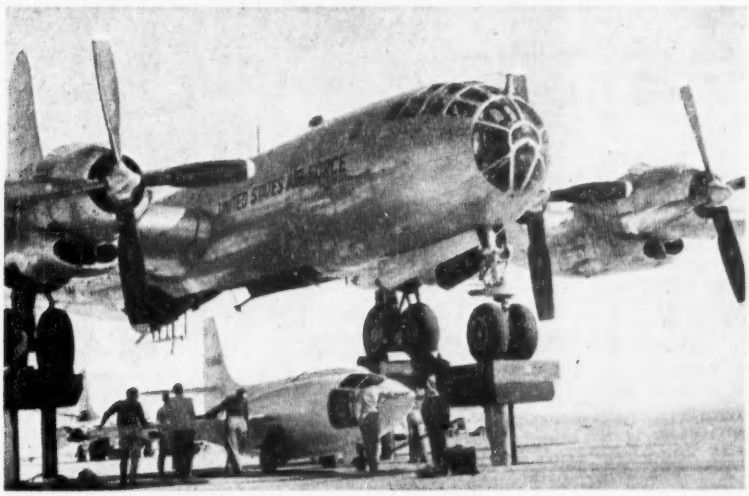
AIRCRAFT INTELLIGENCE





LOADING METHODS for two purposes are shown. The twin-boom machine is the latest Fairchild XC-120 and has been dubbed Sky Trailer because the cargo compartment can be fitted with wheels and—minus its nose and tail—can be used like its highway counterpart. Seen jacked up at Edwards Air Force Base to receive a Bell X-1 supersonic research aircraft in its bomb bay is a Boeing B-50. In early tests B-29s were used for air-launching the X-1, but the B-50, with its turbo-supercharged Wasp Major engines, permits a higher release-altitude.

Great Britain

Slingsby Grasshopper. The name Grasshopper has been conferred by the Air Council on the Slingsby primary sailplane as used by the Royal Air Force.

de Havilland Export Fighters. The first de Havilland Venom N.F.2 night fighter of a substantial order from Sweden is now on test. It will shortly be followed by the first of a batch of Vampire 52s destined for Finland and bearing swastika markings. From Venezuela it is learned that a Vampire Trainer has now been assembled there. This machine is non-standard in having refrigeration equipment.

Auster Cirrus Autocar. Four of the latest spraying versions have been bought by the Food and Agricultural Organization of the United Nations; they will be operated in Kenya by the Desert Locust Control. The order follows a series of highly successful tests in which spray-equipped Aiglets were used to attack locust swarms; an Autocrat was also employed to spot the swarms and report them to the spraying aircraft. Ground parties reported that the proportion of locusts killed per swarm was usually as high as 99 per cent. Powered by Cirrus Major III engines of 155 h.p. the Autocars are single seaters, space normally taken by the other three seats being occupied by a 70-gallon insecticide tank.

U.S.A.

Boeing KB-47. Projected under this designation is a tanker version of the Boeing B-47B six-jet bomber. Conversion kits, one for the Boeing flying-boom technique, the other for the probe-and-drogue method, will permit quick transformation from bomber to tanker.

Cessna L-19 (turbine-powered). Illustrated in *Flight* of November 21st, the Cessna XL-19B liaison aircraft, powered with a Boeing 502-8 turboprop, has now completed about 20 hours' flying. Following the present trials a Turboméca Artouste, a reduction gear for which is being made by the Continental engine company, will be installed in an L-19C.

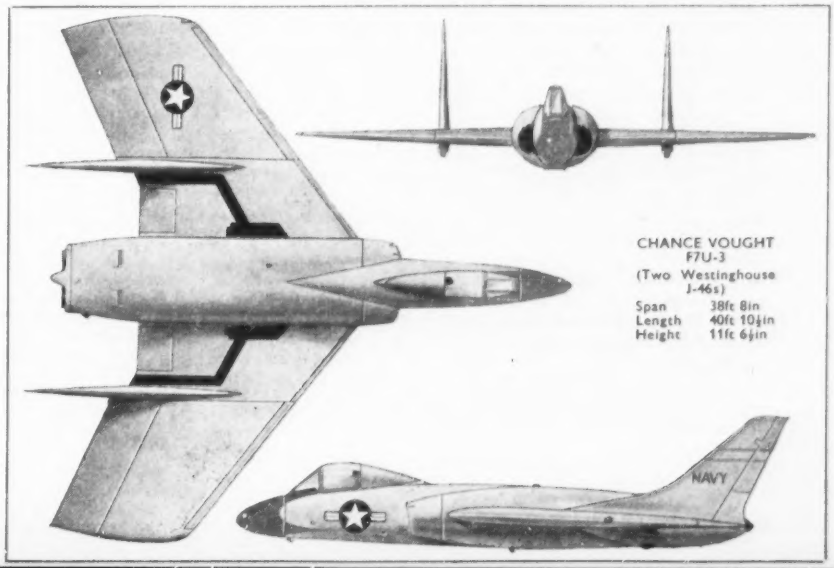
Bell XHSL-1. Specifically designed for anti-submarine operations, this twin-rotor helicopter is due to fly early in the New Year. The engine is a Pratt and Whitney R-2800 and the aircraft will carry not only search radar but special anti-submarine weapons. The blades of the rotors will fold for shipboard stowage. This is particularly important because the XHSL-1 is designed to operate from cruisers and other medium-sized vessels, as well as from small aircraft carriers. A commercial development, capable of carrying about 20 passengers and of cruising at 120 m.p.h., is envisaged.

Lockheed Super Constellation. Commercial orders for this "stretched" version now total 96, of which 24 are in service. The makers report that production is assured well into 1954. The airlines concerned are K.L.M., Air France, Eastern Air Lines, Air India, T.C.A., Qantas, Braathens S.A.F.E., Aeronias Nacionales de Colombia, Iberia, Pakistan International and Lineas Aeropostal Venezolana. As reported on page 15 of this issue, K.L.M. will be the first company to operate the compound-engined version; four of K.L.M.'s order for 13 Super Constellations will be fitted out as 94-seaters for emigrant traffic.

France

S.N.C.A.S.E. Sea Venom. The first de Havilland Sea Venom built for the French Navy by the Société Nationale de Constructions Aéronautiqués du Sud-Est made its first flight at Marignane some weeks ago and is now being evaluated by L'Aéro-Navale. The French Navy roundels, which are similar to those of L'Armée de l'Air but have a superimposed anchor, are painted on the sides of the nacelle forward of the cockpit.

Nord 3501. This type number has been assigned to a turboprop development of the Nord 2501 military transport, designed along Fairchild Packet lines. The main power units will be two Bristol Proteus 705s, and two Turboméca turbojets will be installed as auxiliaries.



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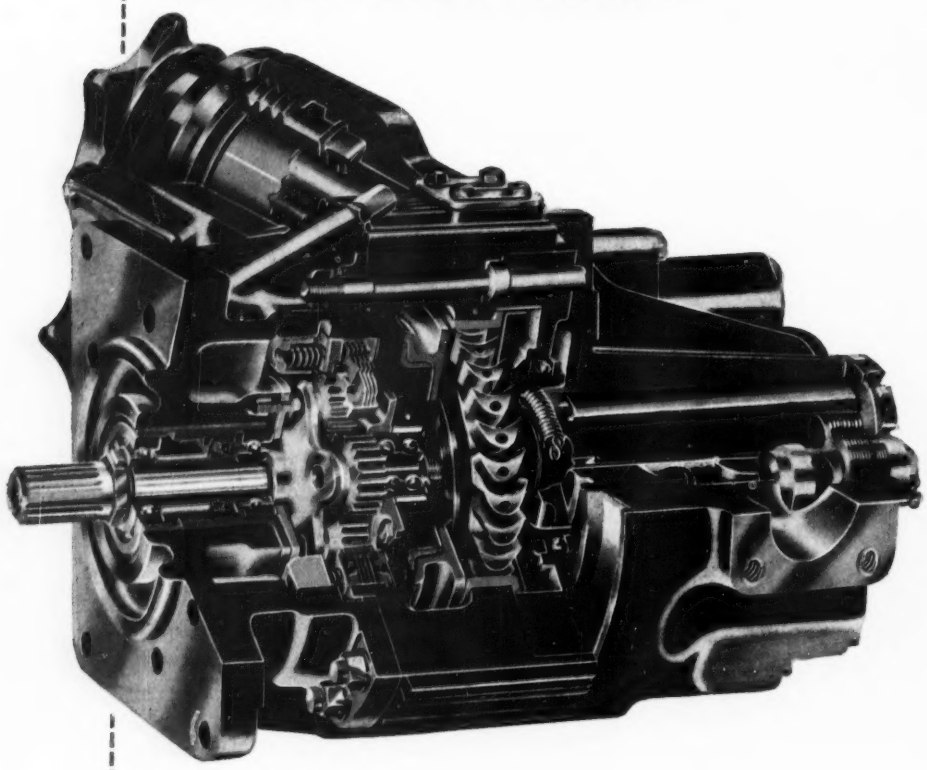

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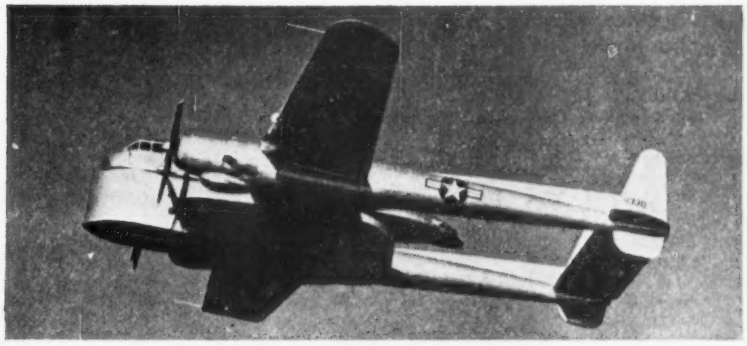

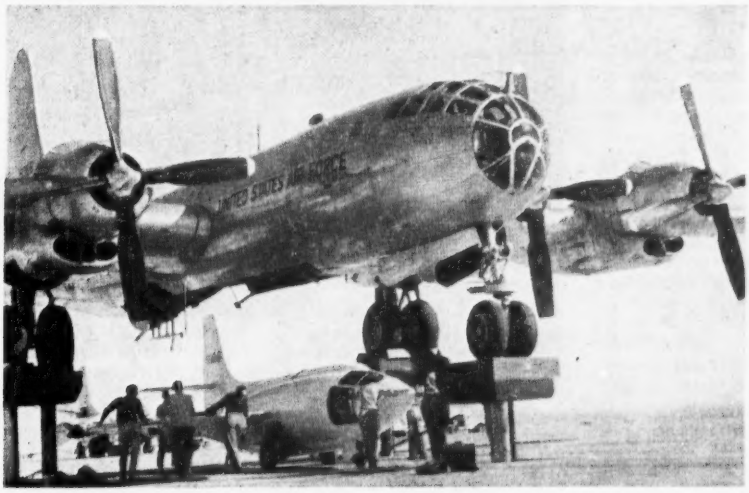

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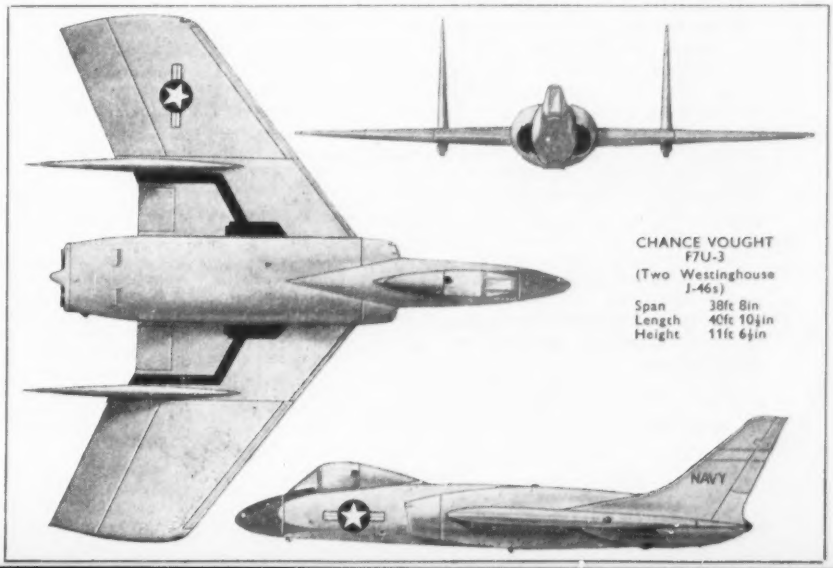
Lockheed Super Constellation. Commercial orders for this "stretched" version now total 96, of which 24 are in service. The makers report that production is assured well into 1954. The airlines concerned are K.L.M., Air France, Eastern Air Lines, Air India, T.C.A., Qantas, Braathens S.A.F.E., Aeronias Nacionales de Colombia, Iberia, Pakistan International and Lineas Aeropostal Venezolana. As reported on page 15 of this issue, K.L.M. will be the first company to operate the compound-engined version; four of K.L.M.'s order for 13 Super Constellations will be fitted out as 94-seaters for emigrant traffic.

France

S.N.C.A.S.E. Sea Venom. The first de Havilland Sea Venom built for the French Navy by the Société Nationale de Constructions Aéronautiqués du Sud-Est made its first flight at Marignane some weeks ago and is now being evaluated by L'Aéro-Navale. The French Navy roundels, which are similar to those of L'Armée de l'Air but have a superimposed anchor, are painted on the sides of the nacelle forward of the cockpit.

Nord 3501. This type number has been assigned to a turboprop development of the Nord 2501 military transport, designed along Fairchild Packet lines. The main power units will be two Bristol Proteus 705s, and two Turboméca turbojets will be installed as auxiliaries.



CATAMARAN FLYING SHIPS

An Air/Sea Compromise for Trans-ocean Travel?

TO combine the advantages of both ocean liners and airliners for transatlantic and similar routes, a form of seagoing vessel, capable of flight, has often been suggested. A present-day champion of the scheme is an American veteran of both sea and air transport. He is Capt. James V. Martin, of the Martin Development Company, Rochelle Park, New Jersey, who flew in England in the early days; he received his R.Ae.C. Certificate No. 55 in February, 1911. In a description of a flying meeting at Hendon, printed in *Flight* of March 18th, 1911, we reported: "At 4.15 the three pilots, Messrs. Greswell, Martin and Hubert, came out on their respective machines, the Gnome-Bleriot, the 'New Baby,' and the Gnome-Farman, and practised the right-hand turn, which they all accomplished with success."

Whether equal success will come also to Capt. Martin's latest project is at present uncertain, but in a recent letter to *Flight* he has presented his ideas with emphasis and vigour. In brief, his submission is that modern sea liners are too slow and aircraft too dangerous for trans-ocean journeys, and that a twin-hull "flying ship," should be developed.

Statistics for 1951, he says, show clearly that speed of crossing is a main factor in the choice of transatlantic transport, for more than twice as many travellers went by air as by sea. Safety is the second big factor which influences the choice, states Capt. Martin, who goes on to emphasize—or possibly over-emphasize—the shortcomings of modern land-based airliners.

The 160,000 h.p. of the liner *United States* is not inadequate to provide higher speeds, he continues, but the available power is wastefully used in driving the vessel through the water, instead of through the "atmospheric ocean," 775 times lighter and less resistant to motion. At present, as much fuel is required to obtain five knots speed above 20 knots as is required for the entire first 20 knots, and resistance to further increased speeds builds up rapidly.

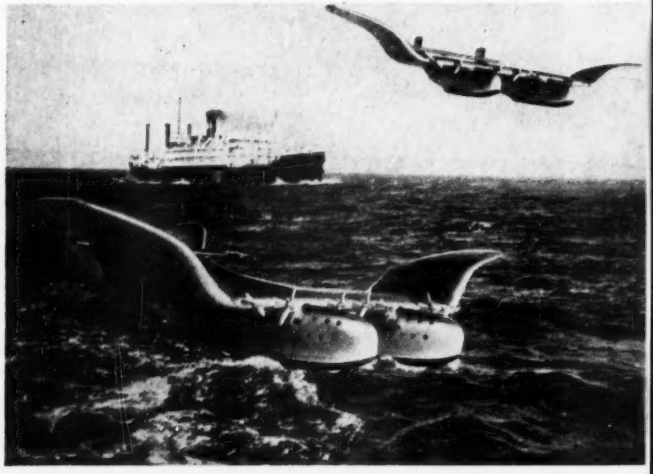
The central-hull type of flying boat offers improved speeds, but lacks wave stability and general seaworthiness. The only effective answer, he feels, is a twin-hull flying ship, which would use its main wing surface to lift the hulls gradually out of their deep draught of water, as the velocity increased. The weight of the entire vessel would then be transferred to "a compressed vortex billow of air rolling forward between the two hulls and under the central wing," both hulls being lifted above the water.

"The vertical inside walls of the twin hulls combine with the under-surface of the intervening wing and with the ocean surface to create an additional lift, plus a reduction in drag, so that the overall efficiency of the ship is 40 per cent higher when flying at a height less than 75 per cent of its wing chord above the mean waves than it would be if flying well clear of the ocean in free air."

From the viewpoints of seaworthiness, passenger comfort and speed, the catamaran flying ship would be superior to conventional surface-vessels, claims Capt. Martin. As 70 per cent of the earth's surface consists of water, the need for fast, safe, comfortable and cheap over-water transport is vital, and the scope of the flying ship would not be confined to passenger use, for freight and military applications exist also. The cost per passenger for transatlantic trips has been estimated to be half that by air; and the 300-ton flying ship with a crew of 23, carrying 500 passengers from New York to London in 10 hr offers in addition obvious advantages over transport by surface vessels.

The twin-hull flying ship would be classed as an ocean-surface vessel, for "it is not more strange to have a catamaran ocean vessel sustained aerodynamically than propelled by sails, which was the universal practice before the advent of steam power."

Thus, Capt. Martin concludes, it is inevitable that this type of flying ship will supersede all other trans-ocean craft. By using the available power now used in conventional ships in this more effective manner, an immediate combination of the aircraft's speed and the surface vessel's safety is possible. These immediate prospects will be improved further as the use of atomic power for propulsion brings increased economy.



Designed to fly just above the ocean surface, the twin-hull flying ship has variable outer-wing dihedral.

By way of a postscript, it may be remarked that the conception, at least in smaller sizes of aircraft, is not a new one. Capt. Martin himself acknowledges the success of the Savoia-Marchetti S.55 twin-hulled flying boats of the early nineteen-thirties.

ROUNDING UP RABAUL

HOW Rabaul was first encircled and then neutralized formed the subject covered by Episode 7 of the B.B.C. Television film *Victory at Sea*. From Guadalcanal, captured the previous year and now a major U.S. base, Kittyhawks, Hellcats, Dauntlesses, Mitchells and Liberators were shown softening up the islands of Munda, Rendova and Bougainville before their storming by U.S. Marines.

The Seabees were seen making one of their incredible airstrip-construction efforts on Munda. The strip was completed in four days and a Corsair was to be seen making the first landing.

After Munda and Rendova came Bougainville itself. Australian advances in New Guinea and the occupation of atolls in the Admiralty and Mathias groups of islands to the north then completed the Allied ring around Rabaul.

Much of this episode consisted of captured Japanese film and was thus of particular interest. Two impressive shots were a fly-past over the Emperor of about 20 Kawanishi Mavis (Navy 97) flying boats, and a much larger formation of unidentified fighters. Ground shots included an engine change, a Japanese "erk" vigorously polishing the wing of a Nakajimi Kate (Navy 97) and some excellent close-ups of twin-engined Mitsubishi Nell (Navy 96) bombers taking-off from Rabaul for a heavy attack on Allied forces.

The episode ended with a sad but spectacular shot of the wing of a Liberator breaking off after being hit by enemy fire.

Beneath the Southern Cross, as Episode 8 was entitled, covered the sinking of the German armed merchant ship *Atlantis* and the scuttling of the famous pocket-battleship *Graf Spee* in the South Atlantic. The increasing tempo of mounting Allied war production was indicated, together with the building up of the elaborate convoy system so necessary to ensure the safe passage of vital guns and tanks across the U-boat studded Atlantic.

Air shots included the launching by catapult of the *Graf Spee's* Arado reconnaissance floatplane and some really excellent views of Goodyear blimps patrolling Brazilian waters. The construction of the big airfield at Trinidad was also shown.

THE PROSPECT BEFORE US

A. Cdre. Banks, in a Presidential Address, Reviews Aviation Trends

THE presidential address to the Junior Institution of Engineers was delivered by A. Cdre. F. R. Banks, C.B., O.B.E., M.I.Mech.E., F.R.Ae.S., F.Inst.Pet., on Friday, December 12th. A. Cdre. Banks was accepting the office of president for the second year, and he remarked that he would not have agreed to a second term of such office for any other body, since his new post —Principal Director of Engine Research and Development, M.o.S.—would require much of his time in addition to that which he would have to devote to furthering certain developments of his firm. (A. Cdre. Banks is technical manager and chief engineer of the Associated Ethyl Co., Ltd.)

For his address, he chose a survey of trends in aviation and their effect on future developments, his title being *The Air and the Future*. After reviewing the progress made in high-speed flight since the advent of the gas turbine, A. Cdre. Banks turned to guided weapons. Although, he said, the present guided weapons had relatively short range and were mainly used for defensive purposes, it was only a step to apply guiding and homing principles to a long-range vehicle. A crewless bomber, which would be self-destroying at the target, could be built for about one-third of the all-up weight and cost of an equivalent conventional aircraft. Such developments would eventually eliminate the piloted fighter, and also, over a somewhat longer period, crewed bombers.

From this A. Cdre. Banks went on to discuss the difficulties at present facing the Air Staff in striking a balance between manned and remotely controlled weapons. He gave it as his opinion that the piloted fighter would disappear within ten years, and the orthodox bomber in 15 to 20 years. It was possible to conceive guided weapons so accurate that air warfare would degenerate into a stalemate, leaving ground-to-ground missiles as the primary weapons. It appeared, in fact, that the rôle of an air force in about 20 years' time would be that of a highly developed transport organization to carry men and equipment.

The president then dwelt upon the crippling cost of current military aircraft. Since these costs were largely due to man-hours of effort, it was difficult to see how any country other than the U.S.A. and Russia could embark upon a production programme involving more than a few hundred aircraft per month *of all types*. In the case of axial turbojets, only about one-third of these units could be produced today compared with the number of piston engines produced in the late war for the same effort.

Turning to civil aviation, A. Cdre. Banks quoted the remarkable figure of two million scheduled airline miles flown each day. In the lecturer's opinion, certain types of turboprop transport would have very useful and extended lives, although he felt that the inherent simplicity of the turbojet would attract a greater proportion of the effort available for development.

The importance of timing the appearance of a new design could not be overstressed. A successful constructor would be considering his next machine while he was selling his present product to the world's airlines. And timing was of even greater importance in the case of engines, since their development absorbed a very lengthy period and had to be completed by the time the airframe was ready. On the subject of axial *versus* centrifugal compressors, the speaker concluded that, despite the greater production effort needed for the axial, its better performance fully justified the extra cost, and nothing but the best could be tolerated for highly competitive military and civil aircraft.

A. Cdre. Banks closed his address with a plea for the provision of more advanced research-tools for British industry. An idea of the expenditure required was given by the example of an altitude chamber for turbojets of 15,000 lb thrust; it was likely to cost at least three million pounds. The Americans already had such facilities, and we had kept our leading position in gas turbine development only by our native ingenuity and ability to improvise. This might not always hold when a large and rich nation like America could put so much effort and money into the provision of research facilities.

A.R.A. WIND-TUNNEL PROGRESS

THE formation of the Aircraft Research Association, Ltd., by representatives of 14 major firms in the British aircraft industry, was announced in January last. The association's purpose was to design, build and operate a large transonic-supersonic wind tunnel, for the co-operative use of the firms concerned. The design phase of the project is now completed, and some further details of the tunnel have been given by Mr. H. Burroughes, F.R.Ae.S., President of the S.B.A.C., in an article in the December issue of the *Hawker Siddeley Review*.

The initial installation will be a transonic tunnel in which speeds up to M = 1.4 can be achieved, with a small supersonic tunnel, to be added later, capable of speeds up to M = 3.0. The transonic tunnel, which is expected to cost about one and a half million pounds, is of the closed circuit type, with a 10ft by 8ft working section and a maximum section of 30ft by 40ft. Work on the site should begin early in 1953, but the tunnel will not be completed for a further 2½ years.

It is the intention that the industry tunnel should be used by the firms for routine tests and *ad hoc* investigations as required, thus freeing the N.P.L. and R.A.E. tunnels for a greater amount of basic research. The cost of building and running the tunnel is being met by the member-firms of the A.R.A., and the amount of working time in the tunnel allowed to individual firms will be proportional to that firm's financial contribution.

The possible circulation of Freon gas instead of air in the tunnel was considered, as this would have reduced the power required and the time spent in model manufacture, but was rejected on the grounds of undue complication. An operating pressure range from 0.8 to 1.2 atmospheres enables some variation in Reynolds number to be obtained, and allowances for future improvements in general tunnel performance have been made in the present designs.

A high utilization is intended, made possible by mounting the working section and the balance carrying a model under test on a bogie which can be moved sideways on a rail system. By using several such carts, models can be installed on the balance and the initial adjustments and calibrations made outside the tunnel while it is running.

The exact site for the tunnel has not yet been finally decided, but will probably be near the National Aeronautical Establishment at Bedford. A.R.A. chief executive in charge of the project is Mr. Ronald Hills, formerly in charge of subsonic aerodynamic research at R.A.E., Farnborough.

ALL-ENGLAND RECOGNITION CONTEST

TWO trophies are to be awarded to the winners of the Sixth All-England Aircraft Recognition Competition, which is to be held at the Royal Institution, London, at 2.15 p.m. on January 17th. The Silver Hurricane Trophy (presented by the Aircraft Recognition Society) will go to the team with the highest aggregate marks, and the Silver Heracles Trophy (presented by Sir Frederick Handley Page) to the team of A.T.C. cadets obtaining the highest marks. Winning teams are to retain the trophies for twelve months. In addition, silver medals of the Air League of the British Empire will be presented to members of both winning teams, and the Diploma of the Aircraft Recognition Society will be given to the individual competitor who scores the highest marks. There will also be a diploma for the best performance by a team from the NATO powers.

The contest, organized by the A.R.S., will consist of the identification of 35 flying views of aircraft, projected on to a screen. Types chosen will be limited to present-day aircraft known to have flown over this country within the past twelve months. The competition is open to teams of three members representing any recognized club, society or body interested in aircraft, or any unit of H.M. Services (including A.T.C. and R.O.C.) or other NATO Services. It is understood that an excellent entry has been received. In addition to the usual Air Training Corps squadron entries, each of the Reserve Command groups is to be represented by a team of A.T.C. cadets. There are entries, too, from the Combined Cadet Force.

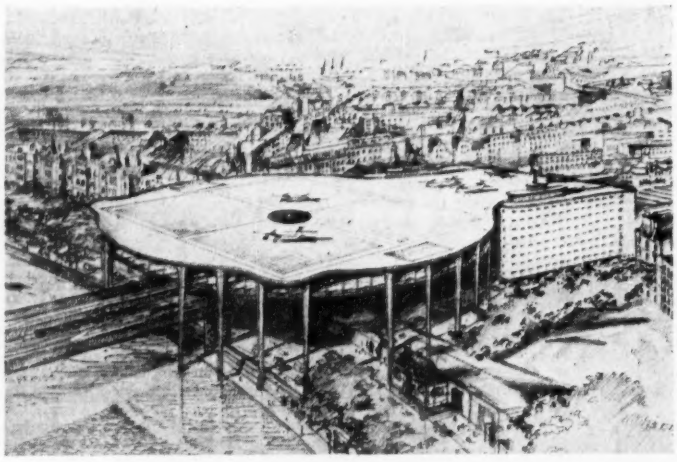
Competitors' papers will be marked by a panel of adjudicators, under the supervision of Sir Frederick Handley Page, as an independent umpire. There will be room for a limited number of spectators. Inquiries concerning the contest should be made to the Hon. Secretary of the Aircraft Recognition Society at 39/40 Bedford Street, Strand, London, W.C.2.

LONDON ROTOR-STATION DESIGN

Proposed Layout for a Charing Cross Station Site

IN May, 1951, Mr. Norman Dodds, M.P., submitted to the House of Commons a proposal for a "helidrome" situated over the Southern Region railway station at Charing Cross, London. To meet the requirements of the Ministry of Civil Aviation, the original arrangement has been modified, and was submitted to the Minister on December 18th last.

Two runways, each 300ft by 150ft, are included as sides of a 300ft square, so complying with requirements of the Inter-Departmental Helicopter Committee. Helicopters can thus land and take-off at the same time without interference. The main alighting platform is made of reinforced white concrete slab and armoured glass, and is supported at a height of about 98ft by reinforced concrete columns spanning the railway and surrounding roads. At the north end of the structure is a nine-storey building, housing suitable passenger handling and office accommodation. Beneath the runways is a lower platform containing hangars and workshops to which helicopters can be brought by lifts for servicing. This is at variance with the ideas of B.E.A.; they visualize no maintenance, overhaul or even refuelling, facilities at a city-centre "bus-station."



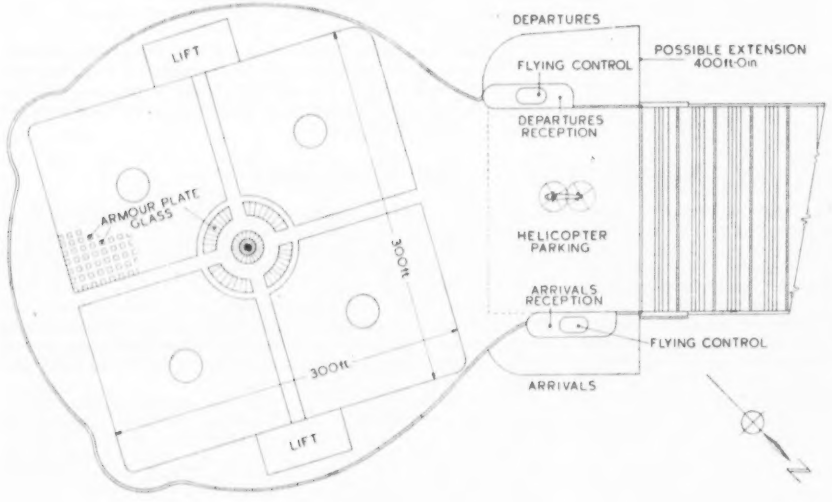
Futuristic, and yet strictly functional, the proposed helicopter station is unlike any other of man's structures. Presumably wind-tunnel model testing would be used to determine airflow in the landing area and aerodynamic stress within the structure.

Mr. Dodds has put forward this ambitious scheme because, as he says, he is concerned at the lack of real progress being made in this field, and feels that his suggestion provides a useful basis for discussion. A great advantage of the elevated landing platform is the significant reduction in the noise heard at ground level; the landing platform is intended to be acoustically insulated and should form a reflector which would be particularly effective during the critical period after take-off, when the noise level is highest.

The actual design work has been carried out by Aslan and Freeman, chartered architects and town-planners. In their opinion, the proposed South Bank rotor station would restrict the development of the surrounding area, and would also—unless mounted on an elevated platform—introduce severe noise problems; they also regard the suggested use of the roof of Waterloo station with disfavour, since this site is inland in a densely-populated area. The Charing Cross site has excellent unobstructed approaches from the river.

Regarding the original proposal of May, 1951, the Ministry of Civil Aviation commented that there might be objections from the Railway Executive on the ground of safety, and from neighbouring premises in the "overshadowed" area. Again, since this was to be a permanent structure, difficulties might arise when the proposed abolition of Charing Cross Station was carried out. On the other hand, there was no doubt that a suitable international helicopter station could be built on this site within 18 months for an outlay of between £4,000,000 and £6,000,000.

Elevated "helidromes" have been mooted for over twenty years past. But this project, unlike those that have gone before, may actually be built. The conception appears to embody many desirable features, and the site looks as good as any other. We believe that the time is now ripe for such a structure to be built; enough has been learnt of helicopter operations to enable detailed plans to be made and it will have to be done before long.



This plan diagram shows the alighting and take-off area only. An opposite pair of quadrants is chosen, according to wind direction, to permit landing and taking off to proceed independently. The platform is floored with armoured glass panels to provide illumination in the workshops below. If the growth of traffic justifies such a measure, it is intended to extend the platform area some 140 yd further to the right, between the main office-blocks and above Charing Cross Station itself.

THE QUARTERMISTRESS

A Designation and its Implications in Airline Crew Duty

By Capt. R. C. O. LOVELOCK, D.F.C.

OF the two titles by which women cabin-attendants in passenger aircraft are usually known, "air stewardess" places the emphasis upon the menial tasks, and "air hostess" has the best sales-value; a third, less usual, is "air quartermistress," and this is one that admits a claim as operating crew. Stewardess, with its suggestion of the cap and apron of maidservant or café waitress, is frankly inadequate and uncomplimentary; hostess, with its acknowledgment of the need for tact, charm, and patience, and reciprocal obligations under the sacred rites of hospitality, is the most pleasing and appropriate term by which an ordinary day's duty in this branch of the flying profession can be described; quartermistress (a term greeted with considerable merriment at first), being the feminine of quartermaster, is an indication of the need at certain times for the exercise of leadership and authority in this work.

All discipline must be justified by a belief in its own necessity owing to danger or urgency, otherwise it will collapse. It must be based upon ethical and logical foundations and be capable of interpretation even if it is not actually self-revealing. Aircrew discipline is non-military in civil aircraft, but the statement is not just a truism. Happily, it is self-revealing, too—unlike some aspects of discipline in the armed forces. It is the discipline of mountaineers, of expeditions going forward in defiance of the starkness of natural forces, and of merchant seamen. It is the amalgamation of skill under an appointed leader in order to ensure the common survival of the party or crew.

An aircraft setting out with passengers on board contains, with its crew, a unified party of travellers. The sense of urgency is felt by the passengers too, and manifests itself in their willingness to be guided by the crew and to receive orders from them—so long as confidence is present. This desirable confidence must be maintained, under ordinary circumstances, by the external signs of all discipline—a correct bearing and appearance—on the part of the crew. In times of emergency it must be maintained by calm, clear, and firm orders, and by a methodical sequence in carrying out safety precautions or drill. When an aircraft has been prematurely forced down on land or sea, the captain and crew are still responsible for the passengers' lives until rescue has been effected, because the original band of travellers has merely exchanged one untrustworthy natural element for another.

Unfortunately, the command of an aircraft crew is not absolutely straightforward. Each crew-member, with the exception of the first officer, is a specialist in a different branch from that of the captain; but although a captain must consult and respect his crew's individual opinions on appropriate matters, his command remains absolute, owing to the potential dangers which (as in most forms of transportation, to a greater or lesser degree) menace the whole operation.

The cabin attendant is responsible directly to the captain in all duty between bases. The particular responsibilities of such a person in any kind of forced landing are to ensure that all the passengers survive the landing, to see that they are able to get out of the aircraft quickly after it has come to rest, and subsequently to co-operate with captain and crew to ensure the ultimate survival of the whole.

The essence of a woman cabin attendant's value in time of emergency is her ability to have been able to visualize previously the sort of circumstances in which she is likely to be required to change the ordinary duties of an air hostess for the authority and leadership required from her as an air quartermistress. It is likely that the need may occur when it is least expected; when there is barely enough time to complete preparations unless she slips into the emergency drill immediately and automatically; and when the most startling aural (and even visual) distractions have started to occur. It is essential that the preparations be completed, no matter how desperate the plight of the aircraft may seem. She will have these great advantages: that the passengers will be eager and receptive to suitable orders, and that she can absorb all her energies in that most satisfying of all tasks, consideration for others. She should be able to take up her ditching or crash-landing station conscious of a team duty well performed, and that she has not broken faith with the people whose lives have been entrusted to her care.

Obviously, the changeover from air hostress to air quartermistress cannot be a Jekyll-and-Hyde metamorphosis; the seeds are fundamentally in the person's character, hence the severe selection boards; mechanically, there is the drill to be learnt and practised; finally, there is the quality of imagination, which can draw self-confidence from the drill and make it merge with the leadership inherent in the character of those selected. The courage of women, as a sex, is quite beyond doubt.

CAPTAIN A. S. KEEP

THOSE who knew him in the Service and in his years at Westland Aircraft will be grieved to learn of the death of Capt. A. S. Keep, M.C., which occurred recently in Somerset.

Arthur Stewart Keep joined the Royal Warwickshire Regiment in September, 1914, and went overseas with it in November, 1915. He was invalided home in 1916 and transferred to the R.F.C., gaining his wings in August 1916.

Until January 1917 he was engaged in ferrying aircraft and then went overseas as a test pilot. In January 1918 he was posted to No. 55 Sqn, Independent Air Force, stationed in Alsace-Lorraine and equipped with D.H.4s. He took part in daylight bombing raids on Mannheim, Coblenz, and other targets and was awarded the Military Cross after the famous Cologne raid, at that time the longest daylight bombing operation of the 1914-18 war.

He was wounded and invalided home in July, 1918. Shortly after the Armistice he was sent to Westland Aircraft as Air Ministry test pilot and, on demobilization in 1919, joined the company as their test pilot. In this capacity he carried out all the flying of the Weasel, a two-seat fighter biplane powered by a 320 h.p. A.B.C. Dragonfly; the Limousine, a four-seat cabin biplane fitted with a 275 h.p. Rolls-Royce Falcon engine; and the Westland six-seater (450 h.p. Napier Lion), with which he won the first prize of £7,500 in the small-aeroplane class of the Air Ministry competition for commercial aircraft, held at Martlesham Heath in the autumn of 1920.

He also flew the Walrus, a carrier-borne reconnaissance biplane for the Royal Navy. Basically a D.H. 9a, but with the Liberty motor replaced by a Napier Lion, the Walrus had flotation bags and an observation blister, and carried a crew of three.

The last machine with which Capt. Keep was actively concerned was the Dreadnought "postal monoplane," powered by a single Napier Lion and embodying the "flying wing" theories of M. Woyevodsky, a Russian inventor. The initial test flight took place in May 1924 and ended in disaster, owing to control difficulties. Keep was seriously injured and had to have both legs amputated.

Although this misfortune ended his active flying, he continued with Westland as technical superintendent, later becoming a director of Petters, Ltd. (to take over whose aircraft branch the Westland company was formed in 1935), until his retirement in 1935.

Those who knew Arthur Stuart Keep (writes Mr. A. H. Lukins, who has provided these biographical details) will remember him as a fearless pioneer, whose work polished one small facet of the now bright jewel of British aviation and one whose sense of humour kept him going in circumstances that would have broken the spirit of a lesser mortal.

Hönningstad Finnmark Amphibian

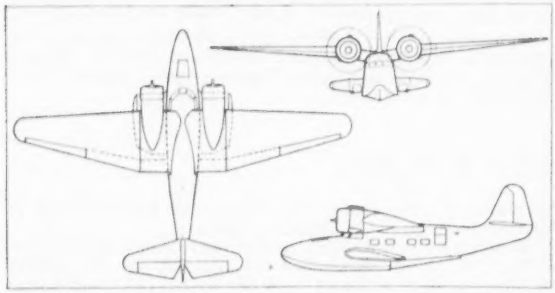
Ingenious Dowty-designed Ski/Wheel Undercarriage

DESIGNED by Mr. Birger Hönningstad, the company's technical manager, the Finnmark amphibian is built by Norsk Flyindustri A.S., of Fornebu, near Oslo, Norway. The prototype now flying is designated Finnmark 5A, but an improved version will be known as the 5A-II.

The Finnmark was designed to suit the special climatic conditions prevailing in Northern and Arctic regions, and is powered by two Pratt and Whitney Wasp R-1340-S1H1 engines. We are informed by Mr. Hönningstad that the machine has successfully completed about 150 hours' test-flying and has shown very good handling qualities both on sea and land. The combined ski/wheel undercarriage "works according to plan" and has no noticeable effect on the exceptionally good seaworthiness inherent in the sponson-equipped type of flying boat, of which the Finnmark is an example. The sponsons serve not only to provide lateral stability on the water but to accommodate the special retractable ski/wheel assemblies. The undersides of the skis fit snugly into the sponsons when the gear is raised and form a flush surface, except for part of the landing wheel, which protrudes slightly below the ski. Although in the accompanying photograph no tailwheel ski is seen in place, this is, in fact, being installed for a new series of trials.

When this photograph of the Finnmark was taken the tailwheel ski had not been installed.

The undercarriage was designed and built by Dowty Equipment, Ltd., working in close collaboration with the Hönningstad design staff. Each half consists of a main leg, the lower end of which incorporates a lever-type liquid-spring shock-absorber, and which is attached to the front spar of the sponson. Retraction is rearwards and a hydraulically operated linkage system is provided for up and down positive locking. The skis are equipped with trimming struts, which ensure a controlled aligning of the skis during undercarriage retraction, and maintain them at a predetermined setting on the ground and in the air. Under the influence of air or ground forces, however, they allow the skis to deflect or rotate on their pedestals. This displacement is positively restricted until a predetermined moment is applied to the ski—a moment sufficient to prevent any ski movement due to air and inertia forces. Thus the skis are kept truly aligned and absolutely stable in the air, though on the ground they are subject to sufficiently great forces to cause them to move and thus allow them to "ride" on uneven snow or ice. The principle of the undercarriage has been the subject of patents in Norway, Sweden and Canada.



Below is the Finnmark's patented combined wheel and ski undercarriage, designed and built by Dowty Equipment, Ltd., in collaboration with the Hönningstad design staff.

"You will undoubtedly have concluded," Mr. Hönningstad writes, "that a combined ski/wheel undercarriage on a flying-boat is a rather heavy weight penalty. However, the purpose of this type of aircraft must be taken into consideration. It ought to be able to perform its duty as a rescue/ambulance/freight or expeditionary aircraft where no other type of ordinary aircraft can be used with advantage."

The general layout of the Finnmark may be studied in the illustrations. There are two passenger cabins with seats for twelve, one main or baggage compartment in the bow of the hull, and one toilet or baggage compartment in the rear. Cubic capacity of the two passenger cabins amounts to 388ft. Dual controls are provided for the crew of two.

The power plants are interchangeable, and each Wasp drives a Hamilton Standard Hydromatic three-blade airscrew. There are four welded aluminium fuel tanks, with a combined capacity of 300 gallons, in the outer part of the wing centre-section.

Dimensions are: span, 62ft 6in; length, 46ft 4in; wing area, 522 sq ft. The following data apply to the Finnmark 5A-II arranged as an amphibian with retractable ski/wheels (the machine can readily be arranged as a normal flying-boat either with sponsons or wing-tip floats): weight empty, 9,966 lb; gross weight, 13,100 lb; maximum speed, 190 m.p.h.; cruising speed (65 per cent METO power at 6,200ft), 156 m.p.h.; rate of climb at METO power at sea level, 1,100ft/min; still-air take-off distance from water, 2,080ft.

R.Ae.C.'s NEW BADGE

THE Christmas number of the *Royal Aero Club Gazette*—a worthy effort on which Editor H. J. Cooper deserves congratulation—has a new cover on which is prominently displayed the revised version of the Club's badge. The caduceus (Mercury's winged staff), with its "contra-rotating" serpents, now bears larger wings; and it is now vertically placed on the burgee, with the crown above it. The change was made in order to avoid confusion with the Aesculapius, the well-known medical emblem, which the former R.Ae.C. insignia to some extent resembled.

As from the January, 1953, issue, the Gazette committee will consist of the following members: S. Kenneth Davies (ex-officio, as R.Ae.C. chairman); Capt. K. J. G. Bartlett (chairman of *Gazette* committee); Geoffrey Dorman; Alex Duncan; F. H. W. Lucas; Col. R. L. Preston (ex-officio, Secretary-General R.Ae.C.).

"The Times Says"

MASS PRODUCTION OF SAPPHIRE ENGINES

U.S. AIR FORCE ORDER

WASHINGTON, Dec. 12.—Mr. Gilpatric, Under-Secretary of the United States Air Force, announced to-day that orders had been given for the British-designed Sapphire jet engine to be mass-produced and he expected hundreds of them to be delivered within the next six months.

The Sapphire, he said, "has successfully passed the rigid 150-hour model test which the Air Force imposes on all new engines before releasing them for mass production. We are extremely optimistic concerning the future of this engine as a result of its excellent performance in recent flight tests in the first F 84 F (Thunderstreak) aeroplane."

He said the Sapphire engines were now in use in some operational aircraft, and a "considerable number more" were coming from the aircraft factories. The Sapphire engine was designed by the Armstrong Siddeley Company in Britain, and is being produced in the United States by the Curtiss-Wright Aircraft Company and the Buick division of the General Motors Corporation.—*Reuter.*

U.S. CINEMAS

FROM OUR OWN CORRESPONDENT

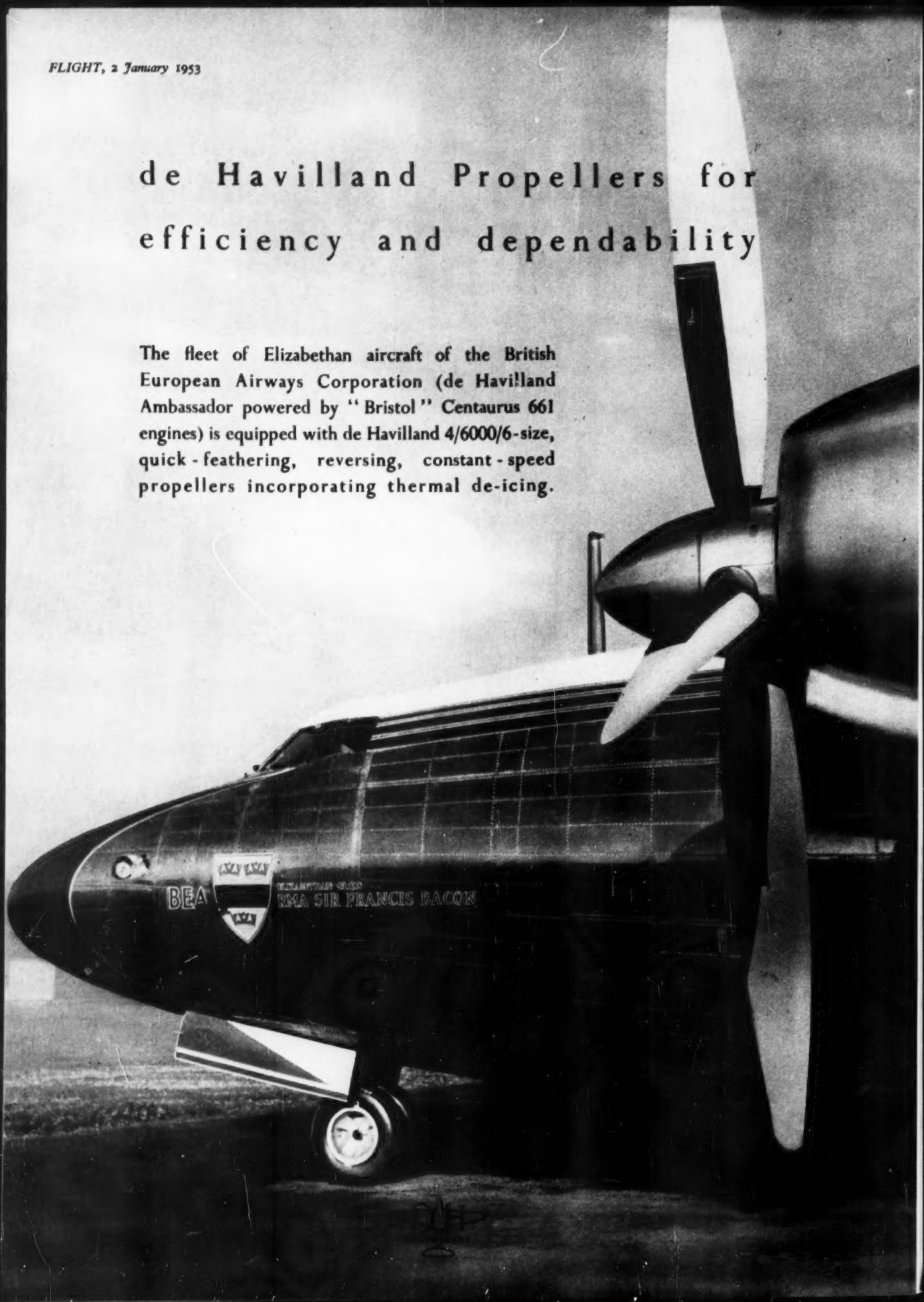
NEW YORK, DEC. 12

The performance of *Carmen* at the Metropolitan Opera House last night was heard and not only by the 3,000 persons in the [illegible] but by nearly 70,000 others in [illegible] cities to which it [illegible] the first

ARMSTRONG SIDDELEY MOTORS LIMITED, COVENTRY

de Havilland Propellers for efficiency and dependability

The fleet of Elizabethan aircraft of the British European Airways Corporation (de Havilland Ambassador powered by "Bristol" Centaurus 661 engines) is equipped with de Havilland 4/6000/6-size, quick-feathering, reversing, constant-speed propellers incorporating thermal de-icing.



This K.L.M. Convair is pictured at Frankfurt, terminal point for many of the airline's European services.

FLYING DUTCHMEN

K.L.M.—An Outline Survey of Equipment, Activities and Policy

By ROBERT BLACKBURN

FOR a country with a population only one and a half times that of Greater London, Holland has done remarkably well in commercial aviation. At least thirty nations are larger than Holland, in terms of area and population, but few are responsible for as large a proportion of the world's scheduled air traffic. A striking indication of the important position won by this small but active state was provided by a recent I.C.A.O. table showing the amounts of air traffic performed in 1951 by the member-nations. Only the U.S.A., United Kingdom, Brazil, France and Australia flew more ton/kilometres on scheduled services than the Netherlands, which performed over 119 million—more than half the U.K. total (231 million).

Dr. Albert Plesman, president of K.L.M.

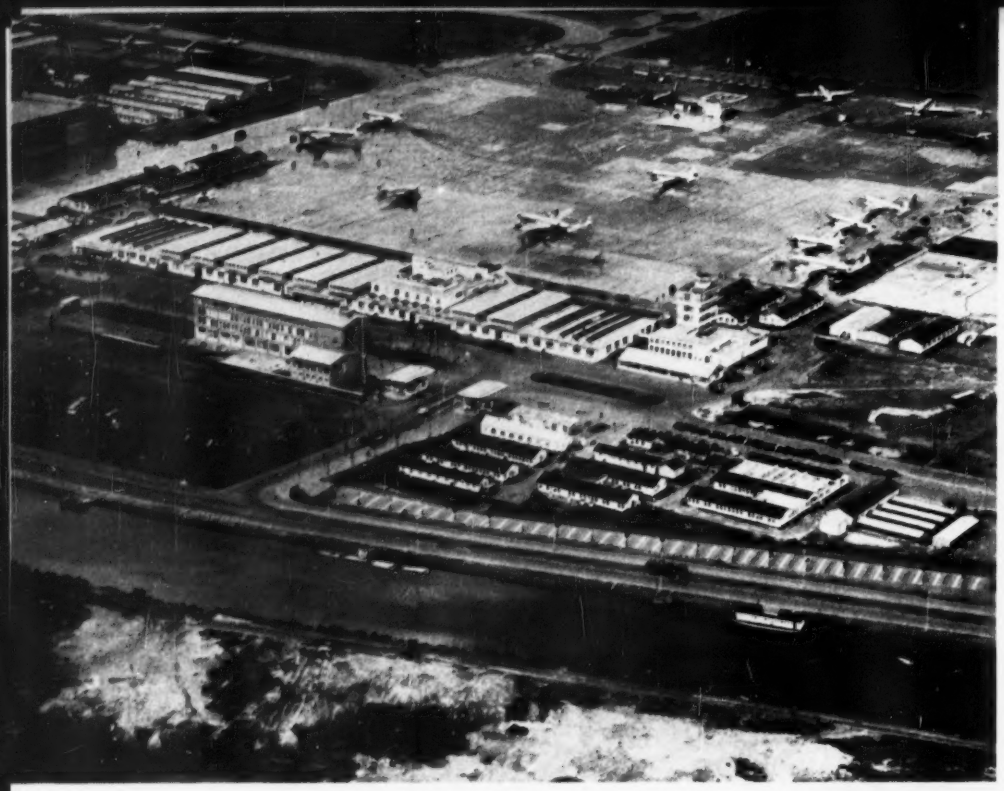
Holland's success as an air-faring nation is, of course, due to the enterprise of the "chosen instrument" —Koninklijke Luchtvaart Maatschappij (Royal Dutch Airlines), better known by the famous initials K.L.M. The name of the company is inseparable from that of Dr. Albert Plesman, who founded it in October, 1919, and remains at its helm today. It has been said in Holland that Plesman is second only to the Dutch Royal Family in popular esteem. Netherlanders are undoubtedly among the most air-minded people in the world, and they share Prince Bernhard's appreciation of flying; his membership of K.L.M.'s board of control expresses active national interest in airline affairs.

The pioneers of aviation have always been practical men—men who would admit perhaps to being shrewd and stubborn, but not to having powers of prediction. And yet there must have been something of the visionary in any man who, in 1919, could foresee the rapid growth of air transport. Such a man was Plesman, then a lieutenant in the Dutch Air Force. His first action was to stimulate public interest in aviation by staging, in Amsterdam, a static and flying exhibition of aircraft. About 4,000 visitors paid for joy-rides and many thousands had their first sight of aircraft at close quarters. The success of this scheme was almost immediate. Within a year K.L.M. had been formed (backed by Government, shipping, commercial and banking interests) and was operating, under charter, its first Amsterdam-London services—three times weekly with D.H. 9As carrying two passengers.

The company is now in its 33rd financial year, and the fleet has grown from four machines to over 70, the route mileage from 600 to over 100,000. Nearly five million people have travelled on K.L.M. aircraft, which carry the legend of the Flying Dutchman to every continent. The network grows constantly, and over five years the average distance flown by each passenger has increased from 900 to over 1,400 miles. Europe provides the airline operators with very few profitable routes, and K.L.M. is not alone in seeking most of its revenue farther afield.

With the obvious exception of B.E.A., the major European airlines offer more capacity on intercontinental routes than on their services within the European region. There are various factors behind this preference for long-haul operations: traffic-centres are often situated too close together; European wages are low and fares are still too high; airmail rates are lower than on long-haul routes; and European weather and terrain are obstacles to intensive night flying. Above all, the fact that the European region is split into so many independent states is responsible not only for a web of frontier formalities but also for over-competition between the many national airlines.

As a result, something like three-fifths of the output of European airlines is in the form of long-haul traffic. In the case of K.L.M., however, capacity offered on regional services, including those in the Caribbean area, represented only one-fifth of the total available (225 million ton km) in 1951. Forced to develop long-haul traffic by the lack of economic routes in Holland and the obstacles to purely



(Left) Terminal buildings and apron at Schiphol — world airport of the Netherlands and the main base of K.L.M.

(Below, left) Overhaul of a K.L.M. Constellation in one of the company's eight well-equipped hangars at Schiphol.

Flying Dutchmen . . .

regional operations, K.L.M. has made the most of its opportunities. The present scale of K.L.M. activities is a tribute to Dutch energy and persistence.

Further expansion of the overseas network—and complete utilization as it stands at present—is largely dependent on the change in international civil aviation policy for which K.L.M. so persistently campaigns. Bilateral agreements giving, at the most, Third- and Fourth-freedom traffic rights* form the framework of international air traffic. Earlier this year K.L.M. described the attitude behind most agreements as "half-hearted," contending that international aviation will be handicapped as long as freedoms are granted to such a limited extent. As is natural for a long-haul operator, K.L.M. require many more Fifth-freedom rights to improve revenue from flights on the trunk routes passing through several countries. Whether or not the Dutch airline's campaign for full freedom will succeed in bringing more multilateral agreements remains to be seen. There is an attractive sound to the statement that ". . . the national airlines and the general public will benefit by a policy of

** The Third Freedom gives an operator the right to set down traffic in another country; the Fourth Freedom enables the operator to pick up traffic from that country and set down in its own territory. To carry traffic between foreign countries is to exercise the Fifth Freedom.*

liberalization providing maximum freedom for travel and unlimited contact with other countries," but there are still many arguments against it.

The centre of the K.L.M. network, the starting point for all but the West Indies regional service, is Schiphol—a fine modern airport five miles (15 minutes by bus) from Amsterdam. Typically flat surrounding land provides perfect approaches to the four main runways (one 7,600ft in length, one 6,450ft, and two of 5,900ft). At the peak period this year, K.L.M. machines were landing at or taking-off from Schiphol at the average rate of one every half-hour (this figure is independent of charter and training flights). The airline's administrative headquarters are a magnificent building set in pleasant surroundings between The Hague and Scheveningen. Such amenities as the employees' medical service, a gymnasium (staff are allowed one working hour weekly for training and indoor team games such as basket-ball), a general store and a barber's shop not only make for a contented staff but a keen and efficient one. Salaries paid to K.L.M. employees are not unduly high, but one finds ample evidence of team-spirit. At the end of February K.L.M. had a staff of 11,972 (3,727 of whom were stationed outside the Netherlands), the ratio of aircrew (including cabin attendants) to non-flying personnel being about 1 : 10.

The composition of the K.L.M. fleet, correct to December 31st, 1952, is as follows: 20 DC-3s, 10 DC-4s, 6 DC-6s, 7 DC-6Bs, 17 L-749 Constellations, 12 Convair 240s. Five of the Constellations are being returned to Lockheed, for resale to an American operator, in part-payment for Super Constellations.

All aircraft are seen to be of American manufacture; the only K.L.M.-owned British machine is an Auster V, whose registration, PH-OTO, neatly describes its duties. The following aircraft are on order (delivery dates shown in brackets): 13 Lockheed Model 1049C compound-engined Super Constellations (beginning early in 1953, ending mid-1954); six Convair 340s (late 1953); and two Douglas DC-6A Liftmasters (1953).

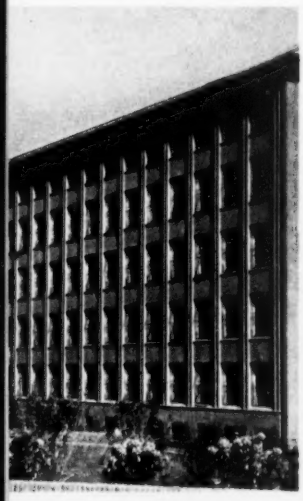
K.L.M. aircraft bear the Netherlands tricolour on the rudder, and the standard colour-scheme is a silver fuselage with white top, separated by a blue flash; *The Flying Dutchman* is normally painted on the port side, with the Dutch equivalent, *De Vliegende Hollander*, on the starboard. Most aircraft bear names, given on the following basis: Convairs, famous Dutch painters; DC-4s and Constellations, place names; DC-6s, members of the Dutch Royal Family; DC-6Bs, Dutch explorers; DC-6As, Dutch aviation pioneers.

The post-war progress of K.L.M. to its present healthy state has been achieved entirely with American aircraft, and the prospects of an early switch to British equipment are—so far, at least—not very good. The Dutch are a hard-headed race, and there is no doubt that they have considered very seriously the qualities of the Comet, Viscount and Britannia. Nevertheless, K.L.M.'s re-equipment programme is based on the continuing use of American aircraft. Reasons are not hard to find. The DC-6B, for example, was a tempting proposition for a DC-6 operator; it offered improved performance and revenue-earning capacity, reasonably quick delivery, and interchangeability of many components.

Likewise the Super Constellation; K.L.M.'s acquisition of this type is facilitated by a $7 million loan from America's International Bank for Reconstruction and Development.

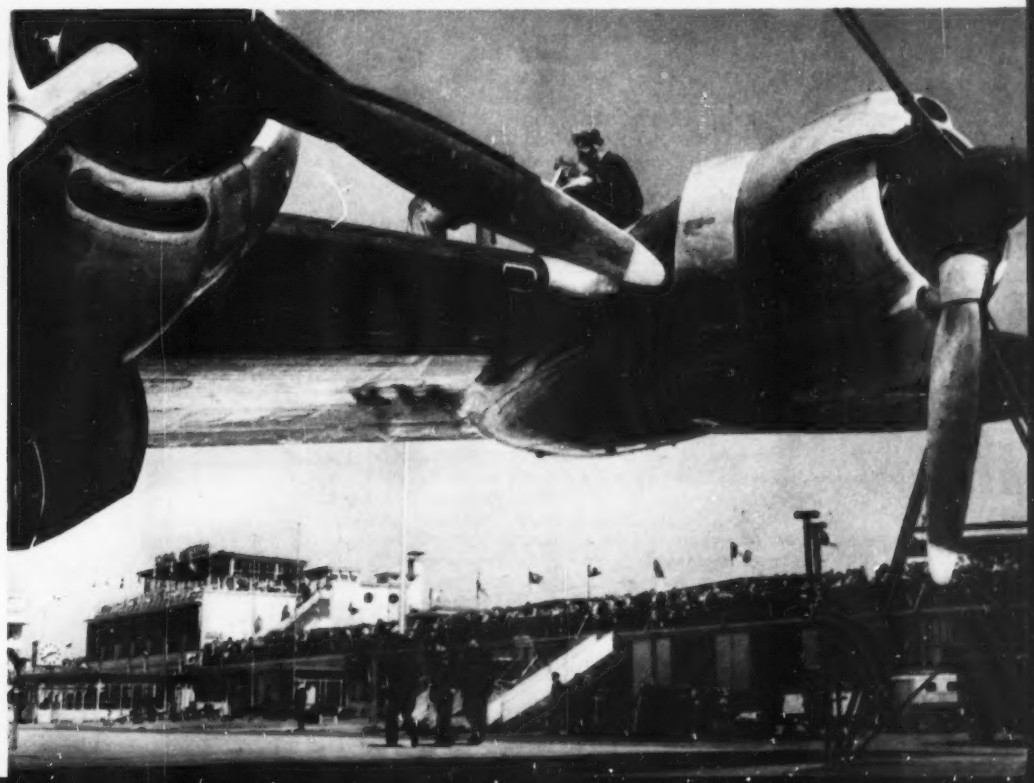
All K.L.M.'s maintenance structure is "geared up" to the use of American machines, and a major factor behind the re-equipment orders is the natural wish to keep overheads at a minimum. Worthy of mention at this point is the "Beneswiss Agreement"—an arrangement between K.L.M., Sabena and Swissair providing for joint servicing and setting-up of spares at certain airports in mutual use. The types of aircraft involved (Convair, DC-6, DC-4 and DC-3) are, of course, operated by all three companies. Substantial savings in overhead costs are known to have resulted from this arrangement. Whether or not its advantages are sufficient to influence heavily the choice of new aircraft is not certain; it is perhaps significant, however, that not one of the three airlines has yet ordered British aircraft.

It is the Dutch airline's practice to write-off its aircraft over a period of five years. Replacement of the American piston-engined machines now on order is therefore envisaged as taking place by 1958-9. These observations throw a side-light on the statement, made some four months ago, that "According to K.L.M., jet planes will be available for more general use in about four or five years' time—thanks to



(Left) A striking blend of functional beauty and traditional Dutch style—K.L.M.'s headquarters, situated between The Hague and Scheveningen.

(Below) Constellation maintenance at Schiphol. The spectators' deck (background) attracts about 1,000,000 visitors to the airport each year.



Pictured on final approach at Schiphol is Petrus Plancius, one of the seven DC-6Bs bought by K.L.M. for transatlantic services.

Flying Dutchmen . . .

Britain's initiative in employing jet propulsion for commercial aircraft. . . . The reason why K.L.M. has not placed any orders for the Comet is that it does not think the time is yet ripe. . . ." The statement added that the main requirements were improvement of the jet transport's carrying-capacity and range, and adaptation of traffic-control organization to suit it.

It would be hard to find a better illustration of the dilemma, faced by so many airlines, resulting from the advent of turbine travel. Superficially, it appears a risk to adopt the new British airliners, the "safer" policy being to buy developed versions of proven American designs. But the conservative policy also brings a risk of losing traffic to a better-equipped competitor. The operational qualities of Britain's turbine-powered trio—Comet, Viscount, and Britannia—cannot yet be measured; only time can show whether K.L.M. chose wisely. Meanwhile, having turned down the chance of cake, the airline hopes to retain its share of bread-and-butter—most of which, as earlier recounted, comes from long-range routes.

There follows a condensed survey of current K.L.M. operations, based on the winter schedules. From Amsterdam the company's four-engined aircraft fly east, south and west. Constellations are used mainly on the Near and Far East routes, flying through Frankfurt, Rome or Geneva to Beirut, Damascus or Cairo. The ultimate points on the eastern route are Singapore, Jakarta and Sydney, with Dhahran, Karachi, Calcutta, Rangoon, Bangkok, Okinawa, Manila and Biak as intermediates. The main southern route to Johannesburg, *via* Rome, Kano and Brazzaville, is flown by DC-6s, which also serve the Near East terminals of Tel-aviv, Tehran and Istanbul. Freight services to Johannesburg are operated by DC-4s, which fly through Cairo, Tripoli, Kano and Brazzaville.

On the highly competitive North Atlantic routes K.L.M. employs DC-6Bs. One interesting interior layout adopted by the company for this type caters for three classes of passenger; it has a four-seat "standard" section out the front, a 45-seat main cabin for tourists, and a luxurious rear compartment with 12 "Sleepair" berths. DC-6Bs fly four times weekly from Amsterdam to New York, *via* Glasgow or Shannon and Gander; a weekly service extends south to Curaçao through Montreal and Havana. Montreal is also served by DC-6s, which now fly on through Monterrey to both Mexico and Havana. Prince Bernhard flew on the inaugural service to Mexico in November. An additional tourist service to New York is also flown by Constellations.

Other K.L.M. services are routed south to Lisbon and Dakar for the South Atlantic crossing to Latin America. DC-6B services to Curaçao fly *via* Paramaribo and Caracas; those to Santiago call at Recife, Rio, Montevideo and Buenos Aires. There are also five weekly transatlantic freight services, all with DC-4s; four link Amsterdam and New York, the fifth serves Curaçao, flying *via* New York and Miami.

Curaçao is the centre of K.L.M.'s Caribbean services, operated almost exclusively with Dakotas. Impending use of B.W.I.A. Viscounts in the area will increase competition and may force K.L.M. to put Convair 340s into Caribbean service, instead of transferring 240s, as originally planned. These regional services connect Curaçao with over 20 airports in several areas, including Florida, Cuba, Jamaica, Haiti, Venezuela, Trinidad, Colombia, British Guiana and the Lesser Antilles. K.L.M. also has a 50 per cent holding in Garuda Indonesian Airways, whose fleet includes eight Convairs, 22 Dakotas, and eight Catalinas.

The European services, which play an important part in feeding traffic to the more profitable long-haul flights, are operated mainly with 40-seat Convair 240s. Two characteristics of K.L.M.'s European operations are the emphasis on its cabotage traffic in Germany—which will presumably suffer when the peace treaty is ratified—and the extent of pooling arrangements with other operators, notably Sabena, Swissair, and S.A.S.

From Schiphol, K.L.M. Convairs fly to London, Manchester, Glasgow, Dublin and Shannon to the west, and to Hamburg, Copenhagen and Stockholm on the north-east. Southward, services radiate to Prague, Dusseldorf, Brussels, Paris and Frankfurt—which serves as a second terminal. Rhein-Main is directly linked by K.L.M. Convairs with several cities both in and outside Germany, including Nuremburg, Munich, Istanbul, Rome, Milan, Nice and Madrid. Other points served include Stuttgart and Vienna.

Use is also made of DC-3s, which operate a few services to London, Manchester, Dublin, Hamburg, Copenhagen and Brussels, and do invaluable work as freighters. So far K.L.M. has made no pronouncement on the popular subject of Dakota-replacement, and, it may be that most of the requirements of the K.L.M. route-pattern are met by the larger aircraft-types already in service or on order. The possibility of a K.L.M. order for the projected Fokker F.27 Friendship has been discussed, but the need for such an order (particularly one involving large numbers) is not immediately apparent. The Friendship will carry only about 30 passengers—and a reduction in capacity would mean an increase in costs on most of K.L.M.'s regional routes. Elsewhere, however, there is a future for such an aircraft, and a national order would be necessary to stimulate sales.

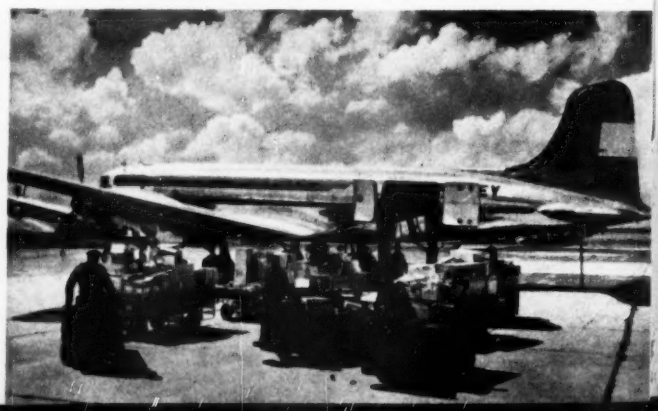
There may also be plans for utilizing the Freightship cargo version; K.L.M. is making an all-out bid to develop this class of traffic, and its efforts have been rewarded by a threefold payload increase within three years. Last year the company opened at Schiphol one of the best-equipped freight-terminal buildings in the world.

K.L.M. has a very active "special flights" division which recently celebrated five years of operations; during that time 2,150 charter flights were made, carrying 64,000 passengers (many of them Dutch emigrants to Australia, New Zealand and Canada) and 2,500 tons of freight and animals.

Dr. Plesman has shown keen interest in the possibilities of helicopters, and tentative plans have been announced for the acquisition of two Sikorsky S-55 helicopters for experimental services *à la* B.E.A. or Sabena.

Without initiating technical advances of a revolutionary nature, K.L.M. has nevertheless made an enormous contribution to airline progress. The picture which emerges from this brief survey is one of a successful airline : a hard-working company which deserves its reputation. K.L.M. has played a full part in the realization of its founder's belief that "The Air Ocean Unites all Peoples."

DC-4s are used by K.L.M. for regular all-freight services to Montreal, New York, Curaçao, Johannesburg, Tehran and Bangkok.



THE ROYAL BELGIAN AIR FORCE HAS ORDERED A SUBSTANTIAL NUMBER OF PERCIVAL PEMBROKE general purpose military aircraft.

- *Already in production for the ROYAL AIR FORCE the PEMBROKE is a development of the civil Prince and Royal Navy Sea Prince proven in over 4½ years rigorous world wide operation.*
- *The PEMBROKE, fitted with the latest radio and navigating aids, normally carries 8 passengers in rearward facing seats and freight or supplies for parachuting to troops, or six stretchers for evacuating casualties.*
- *The Belgian Air Force PEMBROKES, fitted with dual controls for twin engine pilot training, also incorporate the transparent navigator/bomb aimer type nose compartment and camera mountings for vertical, oblique and forward facing photographic surveying.*

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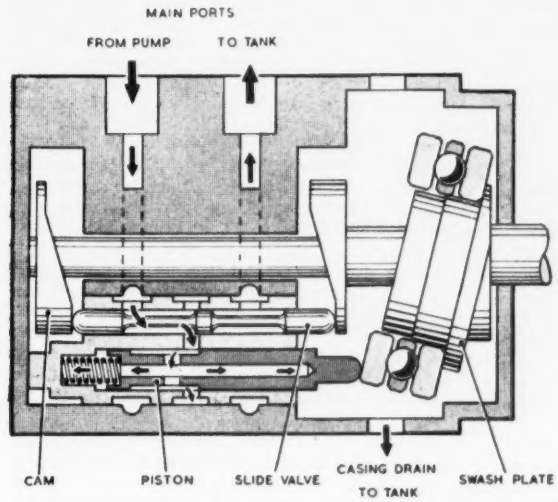
A NEW HYDRAULIC MOTOR

UNTIL recently, auxiliary power requirements on British aircraft have been largely met by the use of electric motors and pneumatic and hydraulic jacks. But increasing demands have caused two new auxiliary power components to take their place in some aircraft systems: the high-capacity, high-pressure air compressor, and the hydraulic motor with a rotary drive.

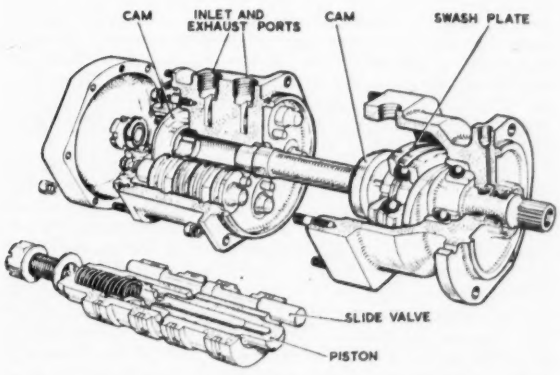
British Messier, Ltd., of Gloucester, are now able to release full details of a most interesting slide-valve hydraulic motor which is being built for certain new types of aircraft. The chief application of this motor is likely to be in the actuation of large area-increasing flaps, the travel of which has, in the past, been too great to permit the use of a simple jack. The hydraulic motor is thus suitable for applications previously filled by heavy electric motors which frequently suffered from short-time ratings.

The makers are to be congratulated on having achieved a power/weight ratio better than 1 h.p./lb, which can be maintained continuously; for brief periods appreciably higher powers can be obtained. Hydraulic motors also benefit from the precise control and virtually instantaneous stopping, or reversal, associated with nearly incompressible fluid systems.

The motor has five piston assemblies which operate on a swashplate formed by the inner ring of a ball race. Admission to, and exit from, the cylinders is controlled by small slide-valves—one for each cylinder—which are reciprocated by a pair of cams. Other data are given in the accompanying table and performance graph.

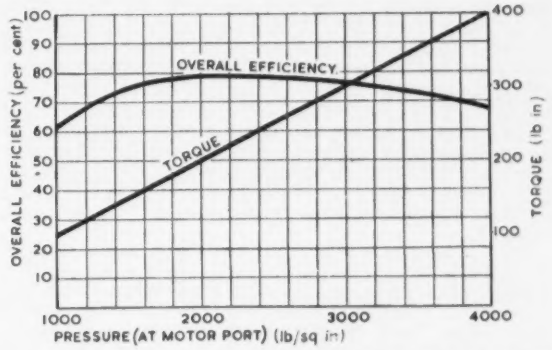


This diagrammatic section shows one piston about to begin its power stroke; the spring prevents bounce on the return.



"Exploded," the five piston and valve assemblies are revealed. The valves are actuated by disc cams mounted on the main output shaft.

The British Messier motor is neat and compact. It is flange-mounted and can be installed in any position, preferably lower than the oil reservoir. Weight is 14.3 lb.



Curves of input pressure against overall efficiency and output torque. The fluid is to D.T.D. 585 at 45/60 deg C, the speed 2,000 r.p.m., and the consumption 30 cu in/sec.

A production unit, after running-in and proof-testing, was exhaustively tested as follows: an endurance test was undertaken at 2,400 lb/sq in, 10,000 valve reversals being completed in 52½ hours without fault. Calibration before and after the test showed very slight deterioration in torque in the clockwise direction, and a slight gain in overall performance in the reverse direction. Refrigeration to – 60 deg C showed that an inlet pressure of 86 lb/sq in was required at this temperature to initiate movement. Static testing with the output shaft locked showed leakage from the two ports of 710 cc/min and 600 cc/min, respectively, at an inlet pressure of 4,000 lb/sq in, the allowable leakage being 1,000 cc/min.

Specification

Cylinder bore	0.53in
Stroke (swashplate at 13½ deg)	0.672in
Swept volume	0.741 cu in
Maximum pressure	4,000 lb/sq in
Maximum-pressure torque	400 lb in
Maximum r.p.m.	2,500
Maximum-pressure output	15.8 h.p.
Minimum speed	300 r.p.m.
Minimum output (4,000 lb/sq in)	1.9 h.p.

HELICOPTERS TO ASSIST TAKE-OFF?

SPEAKING at the Convertiplane Congress in Philadelphia recently, Dr. J. Bennett said that a helicopter tug, beneath which a fixed-wing aircraft could be attached, could be used to assist the take-off and landing, thereby eliminating the necessity of large airfields. He explained that the tug would lift the fixed-wing machine into the air and release it at a forward speed within the speed range of both types. For landing, the fixed-wing craft would attach itself to the tug in the air "in much the same manner as aircraft are refuelled in flight by tankers."

Dr. Bennett expressed the opinion that large aircraft carriers at sea would thus be rendered obsolete, and that it would become feasible for fixed-wing aircraft to operate from merchant ships on anti-submarine duties.

Our American Correspondent Reports . . .

THE calculated "leak" of confidential information, carefully designed to embarrass an opponent in international or domestic negotiation, is a potent weapon. As long as such leaks remain within the U.S. domestic field (and that is quite often), it is not within the province of a foreign correspondent to enter the fray. But when British developments are the subject of both attack and innuendo by such a method, comment is warranted. A recent article in the usually reliable *Wall Street Journal* raises such a case.

On Thursday, December 11th, the newspaper had a front-page article by a staff reporter, date-lined from Washington, and headed "Warplane Snafu" and "British Engine Brings Woe." (It was doubly unfortunate that this first page had been chosen as the subject-matter for an advertisement that appeared in one of the big New York dailies, thereby, no doubt, adding thousands of readers.) After a bitter attack on the alleged production-lags for the U.S.A.F. generally, the article went on to suggest that these delays stemmed from "three main areas, the British-designed J-65 Sapphire engine . . . the Northrop F-89 . . . and the new Republic F-84F. Thunderstreak." The article continued :—

"The Sapphire is the No. 1 headache. Supposed to be about 50 per cent more powerful than the jets now used in first-line U.S. military planes, the engine was designed by Armstrong-Siddeley of England, who sold the American rights to Curtiss-Wright Corporation. Curtiss-Wright, in turn, licensed Buick Division of General Motors Corp. to produce it.

"Although Buick delivered the first prototype Sapphire to the Air Force last September 22, the power plant has yet to pass the 150-hour operational test required by the Air Force. The latest of a long series of bugs is a tendency of aluminium alloy blades used in the engine to 'curl up' at high speeds, it's been learned.

"Despite this not-so-slight imperfection, Buick is now beginning to run out Sapphires in volume. Groans one production man : 'The Air Force has to accept them because planes coming off assembly lines are waiting for them.'

"But he adds : 'The engines are red-lined.' That's Air Force gobbledygook for limiting speed. 'The Sapphires can put out enough power to taxi the planes, and even get them off the ground,' he explains. 'But that's about all.'

"Eventually, when designers have evolved a suitable steel blade, all these engines will have to be modified. That will take time. Still more will be consumed while machines to make the new blades are installed on the assembly lines.

"This bug is just the latest in a long series of Sapphire troubles to plague the Air Force. The job of translating from English to U.S. specifications proved formidable; in fact, the American producers have had to do a lot of re-designing. 'The English aim,' grumbles one engineer, 'seems to be to design an engine that can't possibly be massproduced.'

"This raises the question in the minds of some critics—and some Air Force people, too—whether 'that blank-blank engine' is worth the trouble at all. Whatever the answer, the Air Force is now stuck with it."

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TO English eyes the foregoing will appear incredibly irresponsible. Even allowing for the fact that the reporter in question was apparently being fed slanted information (and he may have been too ignorant of aviation matters to realize it), he seems to have rushed into print rather than check the full facts of the case for himself. For instance, if he, or his paper, had contacted responsible officials in Government or industry about the Sapphire, he might have learnt the true position with regard to the steel-blade situation. He could have been put straight on the actual trouble experienced and could have found out that, far from "when designers have evolved a suitable blade," a suitable steel blade had already been designed in England and had been type-tested to over 8,000 lb thrust early in 1952. Furthermore, he would have been told that details were immediately sent to the States and that such blades are now becoming available here and, indeed, would probably have been introduced earlier if the mass-production methods employed had allowed.

It is always difficult to get behind the scenes in such a situation as this. One cannot know the true reasons; whether the attack is against the engine or against the policy which causes it to be built here; whether the main objective is the U.S.A.F. or some directive they are following; or whether it is part of a subterranean war between two Government departments where the bystanders also get hurt. It is impossible to say for sure, but in all probability this article was inspired from inside a Government agency, and may have been designed to aid a recently propounded but failing policy aimed at reducing the types of engines and aircraft now in production in order to concentrate on a few chosen fortunates, a policy which was rejected by the Air Force and Navy as limiting and impractical. Whatever the cause, however, the harm has been done—not only to the British products which figured in the story, but to American interests as well.

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AS was to be expected, the U.S.A.F. reaction was immediate, though it consisted of what seemed to be an only mildly effective Press conference, during the course of which the Air Force Under-Secretary denied some of the accusations and tried to put the others back into perspective. His statements were fairly widely quoted, although the offending newspaper treated them with some disdain and, by its handling, implied that, although denials were being made, they weren't supported by facts. The Curtiss-Wright Corporation also issued a statement, rather a mild one in the circumstances, in which they pointed out that the J-65 was already operational in the flight tests of the Republic Thunderstreak, and that such attempts to discredit aircraft production here "could interfere seriously in the defence of the United States." Unfortunately, nobody, anyhow so far, has thought fit to mention that the Sapphire is in production in the United Kingdom, that it has passed its type-tests at powers which may well be as great as those of any engine type-tested here in America, and that its overall running-time both on the bench and in the air must surely be in excess of 10,000 hours. [The figure at Christmas was 10,233 hours total, of which over 8,000 were bench running, some 1,500 in flight, and an additional 600 represented ground running and ground tests in airframes.—Ed.]

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IT is such inadequate defences as these that raise important questions of policy. For at the present time (or so it seems to this correspondent) it is very necessary both from commercial and from military and political viewpoints to ensure that British developments are presented to the American public in proper perspective and with a reasonable degree of accuracy. In the past there has been a school of thought that has counselled silence when misrepresentations about British efforts have been written or spoken. In small things this is probably wise advice—but it seems questionable whether, under major attack, we should not reconsider the situation. Unfortunately, in any case of this kind, a denial or correction can seldom catch up with the original damaging statement.

This being so, could not some action be taken to present the British position with sufficient clarity on a day-to-day basis to prevent the accusation in the first place? If so, who is to do it? And how? As far as the writer knows there is no official body in the States looking after the reputation of the British aircraft industry. Presumably the British information services, both in New York and Washington, can and do take cognizance of matters such as that reported here—but they are not technical bodies, and would find it hard to do much in the way of constant education of the Press and public. One or two of the larger British manufacturers have actual U.S. representatives here who would undoubtedly fight their firm's battle if the occasion arose, but they cannot

be expected to look after everyone else's interests as well. One group of companies is believed to be represented by an advertising agency who must include public relations in their duties; but, on the whole, the weight of public relations on behalf of the British aircraft industry seems to fall on some half-dozen or so members of that industry who have, over the years, built up a close liaison with their American counterparts and technical Press, and who can, and do, try to keep things on an even keel whenever the opportunity arises.

Yet this hardly seems good enough, for it should be remembered that an accusation against one British product is an attack on all of them, and that such an assault must, in today's atmosphere of competition, fall on fertile ground and be used as ammunition by the less scrupulous. Maybe consideration might be given to either the appointment of a technical adviser to the British information services, or to a full-time representative of the British aircraft industry, or perhaps to the formation of a small committee in the States, composed of representatives of our industry who are here on business and who could use their combined influence to try and overcome the international injuries which articles like that in the *Wall Street Journal* inflict on our two countries.

Any plan of this nature is a long-term project, however, and must be aimed at creating a state of mind rather than coping with specific instances. Most of the American aircraft industry and technical Press would be sympathetic to such a course. The exchange visits arranged by the S.B.A.C. and the A.I.A. and the joint technical conferences of the Royal Aeronautical Society and the Institute of the Aeronautical Sciences have, and are, removing misunderstandings on an executive and technical level; and the latent goodwill—which must not be confused with competitive desires—is deep and real. But the degree of understanding that will prevent the type of article under discussion requires a wider foundation and a more general approach; and it must include the daily Press and the big weekly magazines. For unless the general public is included, any educational programme is useless. How to achieve all this might well form the basis of a discussion at the next meeting of our two countries' aviation representatives.

Sapphires: Righting the Wrong

SINCE the above was written an unusually informative advertisement, and one which should do a good deal to correct the mis-statement described by our correspondent in America, has been published by the Curtiss-Wright Corporation. Prominently displayed in the New York daily newspapers on December 17th, it gives the following details of the J-65's progress:—

December 15th, 1950.—Initial letter contract signed by the U.S.A.F. for the Curtiss-Wright Sapphire. *February 23rd*, 1951.—Conversion of British drawings to American standard completed. *February*, 1951.—C-W.-modified, British-built Sapphire flight-tested in prototype Republic XF-84F. *November*, 1951.—C-W.-modified, British-built Sapphire became first engine to complete full-scale military climatic test (−60 to +130 deg F). *December*, 1951.—First five American-built tool-trial J-65s delivered to the U.S.A.F.

April, 1952.—Curtiss-Wright J-65 Sapphire completes preliminary U.S.A.F. flight rating test. *April 19th*.—Production J-65 deliveries start. *June 4th*.—Production delivery to Republic corporation commences.

July, 1952.—150-hr test at thrust over 7,200 lb completed. *September*.—150-hr Air Force test with aluminium compressor blading. *November 23rd*.—Production J-65 flies in production Republic F-84F Thunderstreak. The J-65 Sapphire completes 5,000 bench hours and 400 flight hours and is selected to power four types of "advanced military aircraft." *November 29th*.—150-hr substantiation test with steel compressor blading. *December 3rd*.—Air Force accepts first production F-84F Thunderstreak. *December 10th*.—Additional 150-hr test to substantiate sub-contracted parts; 3,000 sub-contractors in 28 States.

BRAZIL GOES AHEAD

Ambitious Plans Developing for Aeronautical Centre: Fokker S.14 Licence Likely

PROFESSOR FOCKE, formerly of the German Focke-Wulf company, and two assistants, Werner Belits and Karl Degenhardt, have been engaged by the Brazilian government to collaborate with the Air Ministry at the Technical Aeronautical Centre of Sao Jose dos Campos. Two one-time "Fw" engineers, Friedrich Schaper and Gerriet Winter, are already at work in the centre on four-year contracts.

In 1945, owing to the growing needs of commercial aviation, Brazil began considering three schemes to remedy the scarcity of aeronautical engineers: to engage foreign technicians; to continue sending young men abroad for training; and to build a training centre in Brazil. The Air Ministry adopted the third solution, which offered many economical and other advantages, and invited Professor Richard Smith, of the Massachusetts Institute of Technology, to come to Brazil in 1947 and suggest measures for carrying the proposal out. Plans were drawn up for a Technical Aeronautical Centre, to be built at Sao Jose dos Campos, on the Rio to Sao Paulo highway, within convenient distance of the port of Santos, thus facilitating transportation of equipment by land and sea.

The site is located in a broad valley and has ample space for extensions and for an aircraft factory. The centre comprises a Technological Institute of Aeronautics (ITA), for training and research, and three "Co-operating Institutes" to co-operate with the aircraft industry, civil aviation and the Brazilian Air Force. For the present the functions of these institutes are centralized in ITA. The latter includes a Preparatory (or Pre-Engineering) School and a Professional School, in each of which the courses are of three years' duration.

Tuition is free, but students undertake to serve for two years as reserve officers in the Air Force after graduating. The government provides food at cost price and makes grants to students when necessary. Candidates must pass an examination to enter the preparatory school, in which the second and third years are devoted to the basic subjects of any engineering course. The professional school specializes in aeronautical engineering, aircraft manufacture, airport construction and electronics. Students, after graduating and taking their B.Sc., may remain for additional courses of one, two or more years in special subjects or research, obtaining degrees of M.Sc. or Dr.Sc. Prospective students may, in accordance with their qualifications, enter in any year of the preparatory school or be admitted directly to the professional school.

The Technical Aeronautical Centre, when completed, will have accommodation for 1,500 students and 300 graduates. It will include dormitories, houses for the teaching staff, quarters for employees and their families, sports ground and stadium, lake and swimming pool, cinema, two military runways, 3,000 m in length, one civilian runway of 2,000 m, eight hangars, two wind tunnels and research laboratories.

The entire project will take some years to complete, but the school was opened without delay in Rio and continued there until the necessary accommodation could be prepared at Sao Jose dos Campos. The original staff included Professor Smith and a number of well-known American professors, to each of whom Brazilian assistants are now assigned for training. The first students graduated in 1950 and an increasing number of candidates are coming forward each year for tuition.

Professor Smith considers that Brazil, as an importer of petroleum products, should concentrate on developing "a type of plane with heavier engine, using less fuel than is customary with British and American aircraft." He looks forward to a day, not very far distant, when Brazil will build her own aircraft. In the design of these cargo space and low fares will receive more consideration than speed and passengers' comfort.

The first step is now being taken to establish an aircraft industry: an agreement is about to be signed with the Fokker company for a licence covering the S.14 jet trainer, and "other more conventional planes," in the Galeao factory at Rio de Janeiro. The S.14, it may be noted, is Derwent-powered, like the Gloster Meteors recently purchased by Brazil. Of the seventy Meteors to be supplied, sixty will be Mk.8s and the rest Mk.7s.

Mr. Robert Masson, Director of Société Nationale de Constructions Aéronautiques du Sud-Ouest, visited Brazil with the French Minister of Air to attend the proceedings of the Brazilian Aviation Week, and while he was there he explained the characteristics of the twin-engined Bretagne and showed plans of the Palas auxiliary turbojet. He has arranged with National Transportes Aereos to return to Brazil for trials with the Palas.

THE AERONAUTICAL BOOKSHELF

"The Crowded Hours," by Anthony Richardson. Max Parrish and Co., Adprint House, Rathbone Place, London, W.1. Price 15s 6d.

MOST readers who sit quietly by the fireside at home (or not-so-quietly in the "8.21 to Town") with this biography will feel pangs of envy that their own lives are less exciting and full of adventure than that of its subject, "Sos" Cohen. But they will also, probably, agree that his experiences are more attractive in retrospect than as highlights in a day-to-day routine.

Lionel Cohen was one of 11 children of a Newcastle ship-owner, and his adventures started even before he ran away from a sheltered Victorian home at the age of 15 to join the Marines. Nor did they end when, more than half a century later, he added a D.F.C. to his D.S.O. and M.C. *in his seventieth year*, after flying 70 operational sorties against the enemy. The intervening years are described in this excellent book as a series of flash-backs, linked by incidents during the 69th sortie, which nearly ended in disaster when flak from an enemy ship set on fire an engine of the Halifax in which W/C. Cohen was flying as air-gunner. Nobody who has read this book will feel surprised that he should be in a gun-turret at such an advanced age.

There is not a great deal of other aviation interest in *The Crowded Hours*, except for one dramatic flight in a free balloon over South Africa at the beginning of the century, and some hazardous reconnaissance missions in B.E.2Cs during World War I. But there is almost everything else—life-and-death encounters with venomous snakes, man-eating lions and Lobengula's Matabele warriors; murders; a sentence of death by firing squad; stories of Cohen's actions in four wars in all three Services; vivid glimpses of life in the Transvaal and East Africa during the pioneer days; and plenty of good, clean humour. It would be difficult to find a more entertaining book.

"Aircraft Instrument Design," by W. H. Coulthard, M.Sc., A.M.I.Mech.E., F.R.P.S. Sir Isaac Pitman and Sons, Ltd., Parker Street, London, W.C.2. Illustrated. Price 40s.

THE instruments with which this book is concerned are those providing visual indication to aircrew members: special emphasis is given to those used only in aircraft; special test equipment is not included. The author, who is a principal scientific officer in the Instruments Department at R.A.E., Farnborough, explains lucidly the design and construction of these devices, with the help of extremely good illustrations. Physical principles on which the instruments are based are described also, but some initial knowledge of physics and mathematics is here assumed. The book comprises four parts, respectively devoted to pilots', navigators' and engineers' instruments, and to automatic flight instruments, and in each part a general introduction precedes detailed descriptions of particular equipment. Appendices on the standard atmosphere and remote transmission systems are included together with a useful list of references for further reading.

"Newnes' Engineers Reference Book." Fifth edition. Edited by F. J. Camm. George Newnes, Ltd., Southampton Street, London, W.C.2. Illustrated. Price 63s.

THIS standard work is—if a *cliché* may be forgiven—one without which no design-office or workshop would be complete. Some measure of its vast scope may best be gained by these brief statistics: 2,000 pages; 87 sections; 2,500 illustrations; 1,100 tables; 6,000 cross-referenced index entries. The work entailed in compiling and revising a book of this kind almost defies the imagination.

"No Distress Signals," by Winifred Brown. Peter Davies, Ltd., 38, Bedford Square, London, W.C.1. Illustrated. Price 15s.

WINIFRED BROWN, as older readers will remember, won the Race for the King's Cup in 1930 in a Cirrus-engined Avian, and is still the only woman to have won the Cup. This book tells the story of her life in the years that followed, with the emphasis on her war-time experiences.

Provided the reader is not sickened by an overdose of Sunday newspaper love-affairs, 200 pages of pub-crawling and a remarkable volume of technicoloured language, there is plenty of interest; as Miss Brown spent the war aboard flying-boat servicing tenders at the Saunders-Roe factory in Anglesea, at a wage of about 50s a week! One meets all sorts of characters, from volunteer trans-atlantic ferry pilots to real Admirals and an incredible assortment of deck-hands. One also meets an equally wide and interesting variety of marine aircraft, including Catalinas, Seafox, Sunderlands, a Shetland, Spitfire floatplane and Coronado; and the chapter describing Miss Brown's part in rough-water tests of air/sea rescue rubber life-rafts proves that war-time aircrews forced to use such equipment were not the only people deserving medals.

"Photogrammetric Mapping from Air Photographs—a Simple Explanation." By the Technical Staff of Hunting Aerosurveys, Ltd. Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Illustrated. Price 7s 6d.

THIS little 54-page book, on an important but highly specialized aspect of air-survey work, has been prepared in such a manner that, while useful to those engaged in such work, it remains understandable by the reader who merely wishes to enlarge his knowledge of modern air-work techniques in general.

Photogrammetry is the technique of making measurements and scale drawings and maps from photographs. It can be applied to any objects, even to fixing the positions of stars in the universe. Terrestrial photogrammetry, making use of photographs taken on the ground, is practical, but has many limitations. Aerial photogrammetry is by far the most widely used application, and it has now become one of the most important instruments at the disposal of the surveyor.

A particularly interesting section of the book deals with stereo plotting, and the frontispiece is a two-colour anaglyph of a river valley, which the reader may view two-dimensionally with the aid of a pair of red-and-green spectacles provided.

"Rockets, Jets, Guided Missiles and Space Ships," by Jack Coggins and Fletcher Pratt. Sidgwick and Jackson, 44 Museum Street, London, W.C.1. Illustrated. Price 10s 6d.

AS an introduction to rocketry in all its varied forms, this book is in a class by itself. There are a few minor inaccuracies in the text, including statements that the Germans fired all their V.1s against London "from huge concrete ramps" and that "even the Japanese called their suicide 'planes *Baka*, which means 'fool' "—but these are more than outweighed by the wealth of other interesting data and scores of superb drawings, many in full colour.

Every type of war rocket is illustrated, from simple Chinese "fireworks" of A.D. 1200 to Allied, German and Jap rockets used in World War II. Most readers will be surprised to learn that "towards the end of 1944, when the landings in the Philippines were going on, the U.S. was using $100,000,000 worth of rockets every day"; and one particularly interesting drawing shows a B.47 using "reversed" rockets as a landing brake. We can learn something about the Royal Artillery Mounted Rocket Corps of 1815, how "hedgehog" rockets were fired to destroy German U-boats in 1945, how rockets are probing secrets of high-altitude flight and how one day we may be able to fly to the moon. Diagrams explain the working of every type of rocket and jet engine, and Mr. Coggins' colour drawings of space stations and exploration of the planets are almost photographic in quality.

OTHER BOOKS RECEIVED

Islands in the Sky, by Arthur C. Clarke. Sidgwick and Jackson, Ltd., 44 Museum Street, London, W.C 1. Price 8s. 6d.

Workshop Practice, Vol. 3, by A. E. Peatfield. (Teach Yourself Mechanical Engineering), English Universities Press, Ltd., St. Paul's House, Warwick Square, London, E.C.4. Price 6s.

Mathematics for Telecommunications, Vol. I, by D. F. Spooner and W. H. Grinsted. English Universities Press. Price 10s 6d.

Autocar Road Tests, 1952, by the Technical Staff of *The Autocar* (Iliffe and Sons, Ltd., Dorset House, Stamford Street, London, S.E.1. Price 5s).—Thirty of *The Autocar*'s road-test reports, covering British, Continental and American cars of all classes, reprinted in book form; this 1952 edition, well illustrated and produced in photogravure, also contains an article describing how the tests are carried out and the standards on which results are based.

The following technical publications have been received from the National Aeronautical Establishment, Montreal Road, Ottawa, Canada: *A Simplified Theory of Swept Wing Deformation*, by A. H. Hall; *The Effect of Surface Active Agents on Petroleum Fuels*, by F. G. Kitson; *Carbon Formation in Flames of Aromatic Hydrocarbons*, by W. Sacks and M. T. I. Ziebell; *Flow Structure and Pressure Recovery in a Supersonic Open-jet Wind Tunnel*, by J. G. Hall; *Thermodynamic Limitations of Ice-Accretion Instruments*, by D. Fraser, C. K. Rush and D. Baxter; and the Council's Quarterly Report. Additionally, we have received, from the Canadian National Research Council's Division of Mechanical Engineering, *Aerial Prospecting for Radio-Active Materials*, by members of the staff of the Flight Research Section, Arnprior, Ontario, and the Atomic Energy Project, Chalk River, Ontario.

THE YEARS AHEAD...

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CIVIL AVIATION

ON COMMON GROUND : The setting for this attractive study of an Aden Airways Dakota and a B.O.A.C. Hermes is Khartoum, where the smaller company's service from Asmara connects with the main B.O.A.C. routes to West and South Africa.

QANTAS BRITANNIAS?

AS a "gesture of friendship", B.O.A.C. has offered to let Qantas take delivery of six of the Corporation's 26 Britannias, provided the Australian airline places a firm order with the Bristol Aeroplane Company. Sir Miles Thomas, who announced the offer on Monday, said that Qantas acceptance would speed the start of British trans-world services by turbine aircraft, and might also "prime the pump" for export sales of the Britannia. By accepting, Qantas would get Britannias at least a year earlier than if they waited for completion of the full B.O.A.C. order. Australian reactions to the proposal are not yet known. During a recent visit, Mr. Hudson Fysh, chairman of Qantas, gave the impression that he was more likely to order Comet 3s than Britannias.

COMET ORDERS AND DELIVERIES

IT was announced recently by B.O.A.C. that its option on Series 3 Comets is for ten aircraft. The first operator to place an order for Comet 3s was Pan American World Airways who also hold an option on a further seven. Assuming a total delivery of only 20 Comet 3s, the number of Comet variants now delivered, on order, or almost certain to be ordered, is more than 80—a figure which from the manufacturer's point of view fully justifies all the financial risk involved in the Comet project. It may be remembered that, in a recent lecture, Mr. C. T. Wilkins, de Havilland's assistant chief designer, said that the company originally estimated that 50 Comets would have to be sold in order to break even.

The number of Comet 1s and 1As ordered was 21—two for the Ministry of Supply, nine for B.O.A.C., three for Air France, three for U.A.T., two for C.P.A. and two for the R.C.A.F. Interviewed recently by our Australian contemporary *Aircraft*, Mr. W. E. Nixon, deputy chairman of the de Havilland Aircraft Co., said that these orders would be completed by June, adding that the first of B.O.A.C.'s eleven Series 2 Comets would be delivered in August. Mr. Nixon announced that there were now orders for 42 Comet 2s, all of which would be completed by mid-1956; this statement indicates that considerably more progress has been made in selling the Avon-Comet than might have been assumed from earlier official announcements. Firm orders for Comet 2s so far published involve only 16 machines, the operators concerned being B.O.A.C. (11), J.A.L. (2), L.A.V. (2) and the Ministry of Supply (1). Among other likely purchasers are B.C.P.A., U.A.T. and PanAir do Brasil.

Mr. Nixon refuted suggestions that production of Comet 2s would be curtailed to promote earlier concentration on Series 3s; he said that if possible de Havilland would begin deliveries of the latter before mid-1956. The Comet 4, which could be expected in 1960, would have longer range, greater speed and high carrying capacity; it "will not be a supersonic job—just a logical development carrying 80 to 100 passengers."

SYDNEY HERON : November saw the introduction to regular service of the first D.H. Heron to be delivered to Butler Air Transport. The aircraft, registered VH-AHB, is seen at Sydney, the centre of the company's 3,000-mile network of domestic routes.

ANGLO-JAPANESE AGREEMENT

CONCLUSION of a bilateral agreement between the United Kingdom and Japan was announced by the British Embassy in Tokyo on December 29th. Signed at the Japanese Ministry of Foreign Affairs, the agreement is basically similar to those negotiated with other foreign countries; it enables designated airlines of both nations to operate scheduled services "between London and Tokyo and between Singapore, Hongkong and Tokyo with certain extensions beyond." Provision is also made for British airlines to operate London-Tokyo services via Canada—a route which B.O.A.C. intend to open with Britannias.

FIRE SERVICES REORGANIZED

A SUBSTANTIAL reorganization and re-equipment of the M.C.A. Fire Service was recently authorised by the Minister of Civil Aviation. Fire cover necessary at M.C.A. aerodromes will be reassessed in the light of past experience, which has shown that the first three minutes of an outbreak of fire in an aircraft are vital, and that speed and flexibility are the first requirements of an efficient fire-fighting organization. To this end more modern fire tenders and additional fast rescue vehicles will be provided, and there will also be greater standardization of equipment. The result of these changes will be to increase the speed of rescue from crashed aircraft by a smaller fleet of faster and more up-to-date vehicles, manned by fewer men. It is expected that the rate of application of foam to a fire in the first few crucial minutes will nowhere be decreased, and in many cases substantially increased.

A.T.C. DISCUSSIONS IN ROME

REPRESENTATIVES of interested airlines forming I.A.T.A.'s Eumed. A.T.C. Panel met in Rome from November 24th to November 29th, with the Italian airline L.A.I. acting as hosts. Specialists of the Italian Air Ministry were invited to a number of the meetings, at which the development of facilities in Italy (including the forthcoming advisory air routes and new Air Traffic Control Procedures for Milan and Rome) were explained and discussed. Other matters which came up for discussion included the redefinition of V.F.R. conditions and methods of control of mixed V.F.R. and I.F.R. traffic; Spanish airways; dummy attacks on civil aircraft; and the future take-over of facilities by the German Government in Western Germany.

Rome Airport, incidentally, became the first in Italy to offer V.O.R. for civil use when the installation at Castel di Decima (ten miles west of Ciampino) went into service on December 3rd on a test basis. The equipment, which is American, operates on a 24 hr basis with a frequency of 115.1 megacycles.

INDIA-PAKISTAN DISPUTE

SOME progress is reported by I.C.A.O. towards a settlement between Pakistan and India on the question of permitting Indian aircraft to fly directly over Pakistan territory from New Delhi to Kebul. The direct route is 642 miles but Pakistan has always insisted on a 1,900-mile detour, claiming that unfriendly tribesmen would make it unsafe for Indian aircraft to cross the Pakistan territory concerned. Delegates of the two governments have been asked to report to I.C.A.O. with a solution to the problem by

CIVIL AVIATION . . .

January 15; they are at present discussing a Pakistan offer of two alternative routes via Kandahar—both longer than the direct journey but preferable to the existing route permitted by Pakistan.

SILVER CITY IN LIBYA

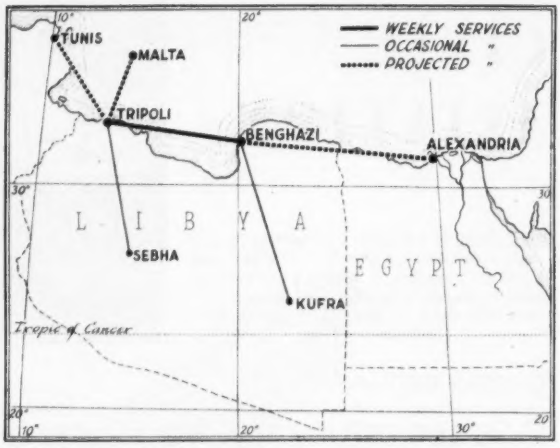
A BRIEF news item in *Flight* of November 28th contained the first intimation that the Government of the newly constituted Kingdom of Libya were proposing to enlist the services of a British independent operator with a view to opening internal airline services. That report was confirmed last week when Silver City Airways announced that they had been granted such a concession by the United Kingdom of Libya and that two Bristol 170s will begin freight and passenger services between Idris el Awal (Tripoli) and Benina (Benghazi) on February 2nd.

Air Commodore Griffith Powell, chairman of S.C.A., told us that he first realized the potentialities of operating in Libya after reading an article in *The Times* which described the difficulties arising from the fact that Libya has two capitals—Tripoli and Benghazi. The resultant demand for transport between the two capitals (particularly when the court makes its six-monthly move from one to the other) is heightened by the indirectness of the land journey, due to the profile of the Libyan coastline, and by the infrequency of ship services. Overland, the distance is 660 miles and the journey takes 36 hours; Silver City's freighters will make a direct 416-mile crossing in some 2½ hours.

Although the British company was faced with both competition and opposition, negotiations were successful and resulted in a one-year concession. Under the terms of the agreement Silver City are obliged to form a Libyan company within the first year of operations, and the Libyan Government has retained the option to hold a major proportion of the shares. Silver City have decided, however, to meet the first requirements from the outset by operating as a national carrier—probably under the name of Libyan Airways.

The nucleus of the airline is already being set up and two (later three) of Silver City's Freighter fleet will be permanently stationed in Libya. The manager of the airline will be Mr. Kenneth Jolly, formerly S.C.A. freight officer, with H.Q. at Tripoli; Mr. F. O. Foster, his deputy, will be based at Benghazi.

The new company, state Silver City, will have as its main object the development of the "short-cut" Tripoli-Benghazi route and is not intended to compete with international trunk route operators. Traffic carried by the Freighters will be that diverted from surface carriers—namely goats, camels, horses, sheep, cattle, motor vehicles and general freight, together with second and third class passengers. Paying £10 single and £15 return fares for the Tripoli-Benghazi journey, second class passengers will fly in the nine-seat separate rear cabin of the freighter; 20 third class passengers will be carried (without sound proofing) at fares of £6 and £11 return behind a movable bulkhead in the centre of the fuselage; space remaining in the cargo hold will be occupied by 6,000 lb of freight. Single fares for animals will be £24 (camels and horses), £12 (cattle), and £4 (sheep and goats). The concession also calls for additional flights, probably on a weekly basis, from Benghazi to Kufra Oasis (575 miles) and from Tripoli to Sebha, inland capital of the province of Fezzan, a journey of 398 miles. It is also intended to open services from Tripoli to Tunis and Malta; special cheap return fares of respectively £10 and £6 are intended to attract troops from the British garrison in Tripoli who wish to visit Tunis or Malta during their leave periods. At present the only scheduled services between Benghazi and Tripoli are those operated by B.E.A. which has cabotage rights in Libya. Three flights weekly in each direction are made by Vikings, at rates which are approximately twice the second class fares to be operated by Libyan Airways.



LIBYAN ENTERPRISE: As reported on this page, Silver City Airways are forming a small subsidiary company—probably under the name of Libyan Airways—to operate between Libya's twin capitals of Tripoli and Benghazi. The drawing indicates the advantages of air travel on this main internal route, where the new airline's Freighters will reduce the journey by some 250 miles, and journey-time by more than 30 hr.

A NOTE FOR NAVIGATORS

MONTREAL has been chosen by the International Airline Navigators' Convention as the venue for its Fourth Annual Convention. The exact date of the meeting has not yet been fixed but it is tentatively proposed to hold it in February. The 1952 convention which lasted three days was held in London last July. Since then the council has published the first issue of its quarterly magazine, the *International Flight Navigator* which is edited by I.A.N.C. chairman, John D. Nicholas, a T.W.A. navigator, and is "dedicated exclusively to promoting the interests of the aerial navigation profession on an international basis." Among the associate editors are Henri Almin of Air France and Einar Pedersen (who was responsible for navigation on the first trans-Arctic commercial flight made by S.A.S. last November), both of whom have contributed articles to the first issue. Almin's article evaluates the requirements of the specialist air navigator, while Pedersen's contribution is a brief but informative review of polar navigation problems.

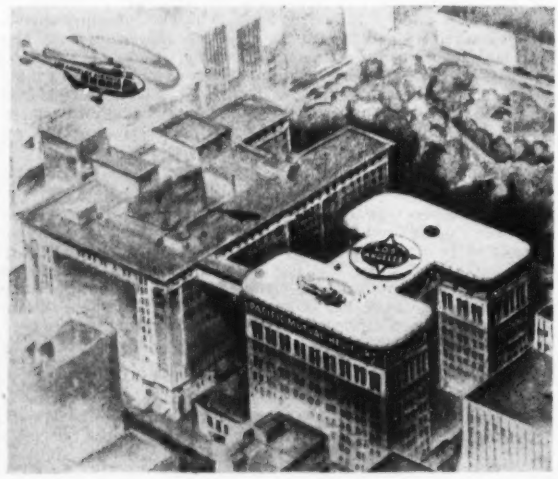
Fred Wirth of Swissair, council secretary, reports that I.A.N.C. membership is now in the region of 700 and that new applications for membership are coming from navigators in many parts of the world.

IMPROVED, ADJUSTABLE CONNIE

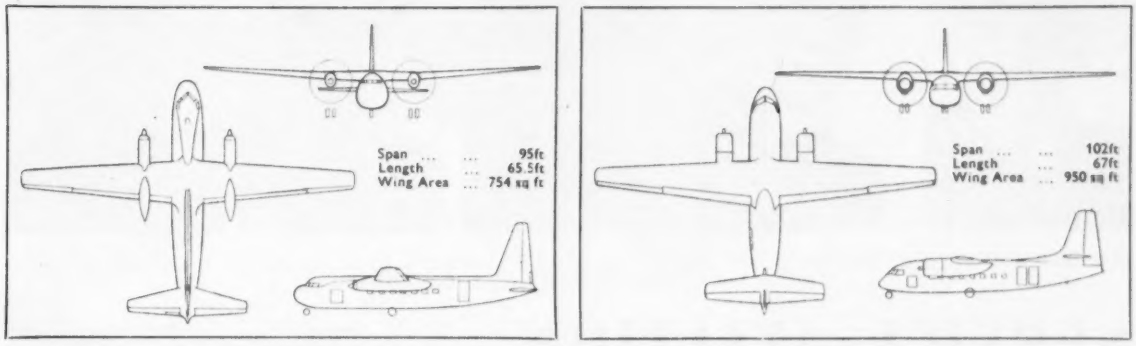
RECENTLY announced by Lockheed is an advanced interior-layout scheme for the Super Constellation which is "engineered for the sophisticate and tourist alike, to keep luxury and economy in profitable proximity." These desirable ends are achieved by means of several alternative interior arrangements, allowing 47 first-class seats, 59-63 second-class seats, or 94 tourist-class seats on international operations, with speedy interchangeability. For domestic use, carrying a smaller crew, up to 99 tourist passengers can be carried.

A concise description of the new interior is included in the Lockheed statement: "For the passenger, the high-style interior provides such innovations as six separate cabins, for greater privacy; a mid-plane lounge, plush with fine paintings and low-backed leather sofas; re-designed chairs with disappearing arms and built-in head cushions; and rich-grained wood walls." Larger windows are also featured, together with "reduced noise, a result of the sound-baffling effect of compartmentation."

The new Super Constellation's main asset, according to Mr. Hall L. Hibbard, vice-president of engineering, is its com-



CALIFORNIAN ROTORSTATION: Subject to C.A.A. and C.A.B. approval this helicopter landing-site will be built "atop" the 12-storey Pacific Mutual Life building in the central area of Los Angeles. It will be leased to Los Angeles Airways, whose S-55s, it is claimed, will provide a six-minute connection with Los Angeles Airport.



COMPETITORS in the Dakota-replacement field are the Fokker F.27 Friendship (left) and the Canadair CL-21, whose remarkable similarity is brought out by these new three-view drawings. Rolls-Royce Dart turboprops will power the 31,950 lb, 28-seater Dutch machine; the Canadair contender, powered by Wright Cyclones and designed to carry 32 passengers, will have an all-up weight of 32,500 lb.

bination of speed, capacity, passenger appeal and convertibility. The machine cruises at 350 m.p.h., and has sufficient structural strength to use the more powerful turboprops, should they eventually replace the existing compound engines. A list of airlines which have ordered Super Constellations appears on page 7.

ICELANDIC A.G.M.

AT the annual general meeting of Flugfelag Islands H.F. (Icelandic Airways), on November 28th, general manager Orn O. Johnson was again able to report an increase in all types of traffic during 1951-52. Compared with the previous year, passenger, freight and mail traffic were up by 10 per cent, 165 per cent and 31 per cent respectively. Revenue earned by the company during 1951 amounted to Kr.13,310,000 (£291,250)—an increase of more than 40 per cent on the previous year's receipts. After deductions, the company showed a net profit of Kr.30,179 (£660).

Flugfelag's aircraft carried a total of 26,443 passengers during the year, over a total distance of 609,550 revenue-miles. Revenue ton-miles totalled 842,140. The company's chairman, Mr. Gudmundur Vilhjalmsson, and the board of directors were re-elected. Their most urgent problem is to decide on replacements for Flugfelag's domestic and international aircraft fleet.

BREVITIES

THREE employees of Airwork Ltd., Mr. McDonald Fraser, Mr. B. A. Martyn and Mr. Bazyl Chmaruk, are claimed to be the only men in the country who now hold both the M.C.A.'s 1st Class Flight Radio Officer's Licence and Class A Radio Maintenance Licence.

* * *

Salary increases of up to £25 a year, back-dated to December 1st, 1952, have been awarded to radio mechanics employed by the Ministry of Civil Aviation.

* * *

Compiled from details published by I.C.A.O. and in other nations' Notams, a list of four-letter place name abbreviations has been published by the M.C.A. in the form of an Information Circular (No. 122/1952).

* * *

Lockheed Aircraft Service Inc. report that they now hold contracts to a total value of $2m (£714,300) for the conversion of 22 first-class Constellations and DC-6s into high density tourist and coach versions for both international and domestic operations. B.O.A.C. are among the operators concerned.

* * *

Tenders have been invited for construction of the new £150,000 terminal building at Renfrew which, it is claimed, will be one of the most modern in the world. It is hoped that work will begin within a few weeks and that the building will be completed by the autumn. The "gate" system, as widely employed in America, will be incorporated.

* * *

The board of directors of Central African Airways have accepted "with reluctance and regret" the resignation of Mr. R. G. McCoy, formerly general manager. The loss of his services, writes a South African correspondent, will be a heavy blow to the corporation—especially in view of the expansion scheme to be carried out this year in anticipation of the Rhodes Centenary Festival.

* * *

Details of operations carried out during the week ended 21st December by Starways Ltd., who operate Dakotas and are based at Liverpool, were received too late for publication. Fifty-seven hours were flown and the figures for passenger miles and ton/miles were, respectively, 122,832 and 3,748. Naafi personnel were carried in both directions between Blackbushe and Nicosia, and there were freight trips—between Nice and Gothenburg and Stavanger and Amsterdam.

* * *

Capt. Stuart Scott became the first B.O.A.C. pilot to complete 400 transatlantic crossings when he brought a Stratocruiser into London Airport on December 23rd. It is believed that only four other transatlantic pilots (all with P.A.W.A.) have passed the 400 mark—Capt. Charles Blair who will shortly make his 500th crossing, and Captains L. Emerson, C. Titus and J. Mattis. Another B.O.A.C. pilot, Capt. "Buddy" Messenger, had completed 395 crossings at the time of writing.

* * *

Difficulty in securing a sufficient number of experienced pilots was responsible for a slight drop in the number of miles flown by Swissair during the third quarter of 1952 compared with the corresponding period last year. The introduction of DC-6Bs, however, effected an improvement in the figure for ton-miles. Statistics for the three-month period (figures for the third quarter of 1951 in parentheses) were : miles flown, 2,108,117 (2,212,432); ton-miles, 7,747,450 (7,292,910); passengers carried, 102,317 (102,661); freight, 1,035 tons (955 tons).

AT MESTERS VIG, new Iceland airport opened last September, is pictured Catalina "Skyfaxi" of Iceland Airways. As reported above, the company carried over 26,000 passengers and made a small profit last year.

HONOURED: (Left to right) Air Chief Marshal Sir William F. Dickson (G.C.B.), Air Marshal Sir Basil Embry (K.C.B.), Air Marshal A. C. Sanderson (K.B.E.), A.V-M. C. A. Bouchier (K.B.E.), A.V-M. D. A. Boyle (K.B.E.).

SERVICE AVIATION

Royal Air Force and Naval Aviation News

NEW YEAR HONOURS

THE names of many officers of the R.A.F. and Dominion air forces appear in the list of New Year Honours and Awards approved by Her Majesty the Queen. Air Chief Marshal Sir William Forster Dickson, who yesterday took over the post of Chief of the Air Staff from Sir John Slessor, is promoted to Knight Grand Cross in the Order of the Bath, and Air Marshal Sir Basil Embry, in the same Order, is promoted to Knight Commander.

In the Order of the British Empire there are 4 new Knights Commanders, including Air Marshal A. C. Sanderson, A.O.C.-in-C. F.E.A.F., and A.V-M. D. A. Boyle, who led the Bomber Command goodwill tour.

Names of civilian recipients of honours will be given next week.

ORDER OF THE BATH

Knight Grand Cross.—Air Chief Marshal Sir William Forster Dickson, K.C.B., K.B.E., D.S.O., D.F.C.

Knight Commander.—Air Marshal Sir Basil Edward Embry, K.B.E., C.B., D.S.O., D.F.C., A.F.C.

Companions.—A.V-M. E. D. D. Dickson, C.B.E., F.R.C.S.(E), M.D., Ch.B., D.L.O., Q.H.S. Act. A.V-M. E. C. Farman, C.B.E. Act. A.V-M. H. P. Fraser, C.B.E., A.F.C. A. Cdre. W. J. Crisham, C.B.E. A. Cdre. J. H. Harris, C.B.E., R.A.F. Regt. A. Cdre. W. H. Kyle, C.B.E., D.S.O., D.F.C., A.D.C.

ORDER OF THE BRITISH EMPIRE

Knights Commanders.—Air Marshal G. Jones, C.B., C.B.E., D.F.C., R.A.A.F. Act. Air Marshal A. C. Sanderson, C.B., C.B.E., D.F.C. A.V-M. C. A. Bouchier, C.B., C.B.E., D.F.C. A.V-M. D. A. Boyle, C.B., C.B.E., A.F.C.

Commanders.—A.V-M. A. C. H. Sharp, D.S.O., A.F.C. Act. A.V-M. V. E. Hancock, O.B.E., D.F.C., R.A.A.F. A. Cdre. F. G. S. Mitchell, O.B.E. Group Captains O. D. Allerton, O.B.E., O.R. Donaldson, D.S.O. O.B.E., D.F.C., R. J. A. Ford, F. A. Pearce, O.B.E., J. H. McC. Reynolds, R. Scoggins, L.D.S., QH.D.S., J. A. Tester, O.B.E., J. N. Tomes, F. D. Tredrey, O.B.E. Retd.

Officers. — Group Captain Maxwell Ormsby Watson, R.A.A.F. Act. G/C. E. J. George. The Rev. T. M. Jones, B.A. Wing Commanders D. M. H. Craven, D.F.C., H. A. S. Disney, K. J. McDonald, D.F.C., A. B. Riall, R.A.F. Regt., L. C. J. Smith, J. W. H. Bray, R.N.Z.A.F. Act. Wing Commanders D. B. Fitzpatrick, A.F.C., P. Lodis, C. L. Turnbull, R.A.F.V.R. Squadron Leaders N. P. W. Conquer, J. H. Cook, R. A. R. Falconer, D.F.M., F. J. Higham, D.F.C., K. G. Hubbard, D.F.C., T. O. Saunders, C. C. Willott, Act. Squadron Leader M. C. S. Shepherd.

Members.—Squadron Leader B. L. Davis, C. A. V. Bounce, R.A.A.F., R. R. Purdie, R.A.A.F., W. J. Hardy, R.A.A.F. Act. Squadron Leaders W. N. Lenton, A.M.I.Mun.E., P. H. Robinson M.C. Ph.D. B.Sc., R.A.F.V.R. T. D. Spencer. Act. Squadron Officer N. S. Palmer W.R.A.F. Flight Lieutenants W. E. Bartlett, F. R. Blythman, C. Cole, G. Cubby, A. F. Grubb, A. W. Harding, A. T. Jarrett, E. W. W. Kemp, L. R. H. King, H. T. Robinson, P. D. Shearwood, B. J. Skibinski, J. L. Sole, R.Aux.A.F., W. M. G. Wing, D.F.M., J. M. Haggett, A.T.C., R.N.Z.A.F. Act. Flight Lieutenant G. N. Earp, R.A.F.V.R. Flight Officer M. M. Hunter, W.R.Aux.A.F. Flying Officer S. R. Podmore. Warrant Officers C. Allcock, J. H. Bollard, F. W. Gathergood, E. B. Gillinder, P. Parkes, I. W. Rebbeck, T. C. Sainsbury, A. F. Shrubsole, W. J. Morris, R.A.A.F., E. J. O. Quinton, R.A.A.F., E. W. Bolton, R.N.Z.A.F.

AWARDS

Bar to Air Force Cross.—Squadron Leader J. S. Higgins D.F.C., A.F.C.

Air Force Cross.—Wing Commanders H. P. Connolly D.F.C., A.F.M., W. A. L. Davis, D.F.C., P. P. Hanks, D.S.O., D.F.C., A. N. Jones. Act. Wing Commanders K. W. MacKenzie, D.F.C., J. L. Mitchell, M.V.O., D.F.C., P. G. Ottewill, G.M. Commander (E) K. R. Hickson, R.N. Squadron Leaders I. D. Bourne, J. Crampton, D.F.C., L. L. Doveton, H. Grant, J. G. Harrison, R. M. Horsley, D.F.C., B. J. Jennings, D.F.M., C. C. McCarthy-Jones, R.Aux.A.F., P. A. Kennedy, D.S.O., D.F.C., J. P. Meadows, D.F.C., R.Aux.A.F., R. S. Sanders, D.F.C., R. G. Wakeford, S. N. Hope, M.B.E., R.N.Z.A.F.

(*To be continued*)

PARTY PIECE: This extraordinary evolution by the Central Flying School aerobatic team was led by the Duke of Edinburgh's instructor, F/L. C. R. Gordon, who, before going to White Waltham, was leader of the "C.F.S. Meteorites." Because a Meteor's Derwents will run for only about 15 seconds in the inverted position, the formation had to break at the top of the half-bunt—with the man in the box inverted above his leader. The other pilots were F/L. D. D. James, F/L. L. A. Titmuss and M/Plt. D. Fisher.

A. Cdre.-in-Chief, A.T.C.

THE appointment of the Duke of Edinburgh as Air Commodore-in-Chief of the Air Training Corps has been approved by the Queen. This appointment, together with those of Admiral of the Sea Cadet Corps and Colonel-in-Chief of the Army Cadet Corps, which the Duke now also holds, has been in abeyance since the death of King George VI. These ranks are entirely honorary and will not affect the present ranks held in the Services by the Duke.

CF-100 Winterization

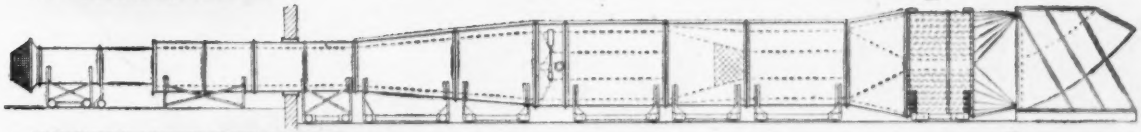
PILOTED by S/L. D. Biden, R.C.A.F., a CF-100 belonging to the Royal Canadian Air Force recently completed the 1,000-mile journey between Ottawa and Winnipeg in two-and-a-half hours. The CF-100 is credited with a range of 2,000 miles.

S/L. Biden was on his way to Namao, where the CF-100 will undergo routine cold-weather tests by the Air Force Climatic Detachment.

R.N.Z.A.F. Ground Attack Wing

THE Royal New Zealand Air Force has formed a fighter-ground-attack Wing comprising six squadrons, two of which are Regular and four Territorial. The first

NO DECIBELS IN DREAMLAND



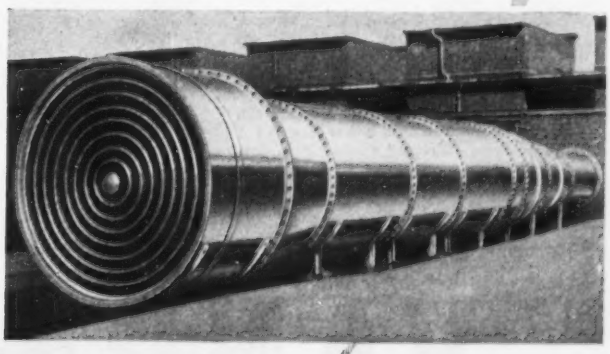
THE

CULLUM DETUNER

As this child sleeps, who would guess that not so far away a new jet engine is roaring on its test bed? It disturbs no-one; for a Cullum Detuner mutes its shattering whine to a gentle rumble.

Super-priority defence production often demands all-night engine testing. And Cullum Detuners (already in regular use by Rolls-Royce, de Havilland, Armstrong Siddeley, the R.A.F. and Admiralty) are helping to make it practicable.

Photograph by courtesy of the de Havilland Engine Company Limited.



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SERVICE AVIATION . . .

squadron, No. 14, has trained on Vampires up to operational standard and is now serving alongside R.A.F.* squadrons at Nicosia in Cyprus. The other Regular squadron, No. 75, has begun its Vampire training. The four Territorial squadrons have an initial equipment of Mustangs and the pilots will gradually be converted to jet flying.

The first full Wing exercise was held at R.N.Z.A.F. Station Ohakea, which is commanded by G/C. I. G. Morrison, O.B.E., who, before assuming command of the station, was in the United Kingdom attending a course at the Joint Services Staff College.

Services Squash Tournament

LAST year's holders of the Services Squash Rackets Trophy, the Navy, were unexpectedly beaten by both the Army and the Royal Air Force this year, and the new champions are the Army. In the third round played also at the Army and Navy Club, the R.A.F. beat the Navy by three matches to two to finish second, The R.A.F. team was Cpl. A. E. Catherine, G/C. B. K. Burnett, W/C. C. H. Beamish. F/O. A. A. Ramus and P/O. R. L. Lees.

R.N.V.R. Flying Times

FLYING times for the squadrons of the R.N.V.R. totalled 10,920 hours during the year ending October 31st, an increase of 1,864 hours or 20.5 per cent over the figure for the previous year.

In topping the "times airborne" and raising their total by 294 to 3,050 hours, No. 1832 Squadron, the largest of the five units, has also completed some 14,000 flying hours since its formation in July, 1947. During the summer, this squadron, which in 1949 was the first to be embarked for training afloat, flew over 1,500 miles to Malta, where the pilots took part in the five-nation N.A.T.O. Exercise Bee Hive.

No. 1831 Squadron of the Northern Air Division, which has its headquarters at R.N. Air Station Stretton, near Warrington (Lancs.), also flew to Malta and during the past year has increased its flying time by 122 hours.

No. 1840 Squadron, at Ford, Sussex, the largest of the R.N.V.R.'s Firefly formations, went afloat for the first time in the light fleet carrier *Triumph* in June and undertook training in the Channel, concluding with a three-day visit to the Belgian port of Antwerp. During this training, a squadron aircraft made 156 accident-free deck landings at sea.

No. 1833 Midlands R.N.V.R. Squadron from Bramcote, Warwickshire, made slower progress, but this was due to a decrease in strength early in the year through a number of its pilots leaving the area and for other reasons. This natural wastage has, however, now been made good by the entry of newly-recruited personnel. This fighter squadron also went to sea in H.M.S. *Triumph*.

Progress reported by No. 1830 Squadron, the only Scots-manned R.N.V.R. flying unit, shows an increased flying time of 66 hours to a total of 1,500 hours. During the past year the squadron returned to Abbotsinch, near Paisley, from Donibristle, near Dunfermline, where they have been operating for nearly two years during reconstruction at the former station.

R.A.F. Yacht Club

THE Annual General Meeting of the R.A.F. Yacht Club was held at the club's headquarters at Hamble on December 6th. The following flag officers were elected: *Commodore:* G/C. E. F. Haylock. *Vice Commodore:* G/C. T. H. Carr. *Rear Commodore:* G/C. F. C. Craig-Alford.

The following four members were elected to the Committee to fill vacancies: A.V-M. Sir Harry Broadhurst, G/C. S. O. Tudor, W. P. Elliott and H. J. Smith.

The flag officers wish it to be widely known that the R.A.F. Yacht Club provides accommodation and small-boat sailing for junior officers (and their wives) at reasonable cost.

The Honorary Secretary is A.Cdre. F. L. Pearce and the address of the club is Riverside House, Hamble, Hants (Hamble 3278). Annual subscription is three guineas a year for ordinary members, with special rates for members under the age of 21.

N.S. AIRCREW TRAINING CURTAILED

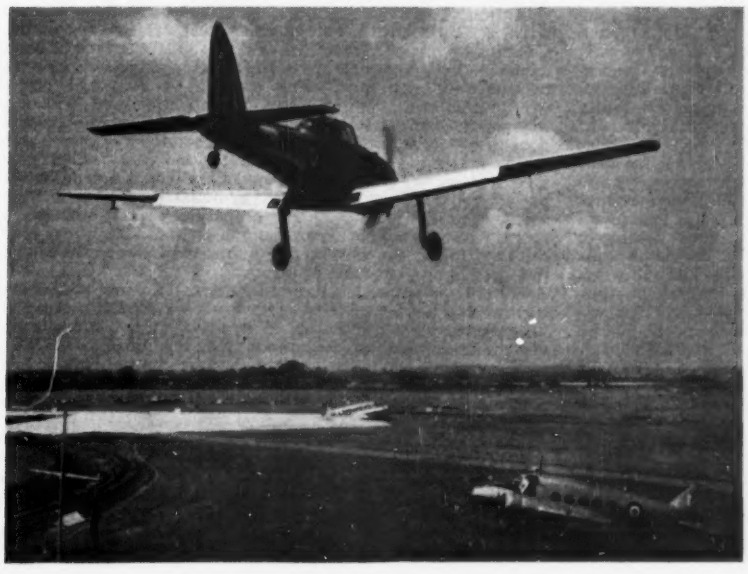
THE changes in the re-armament programme announced by the Prime Minister on December 4th have been quickly reflected in their relation to the aircrew training of R.A.F. National Servicemen. In reply to a question by Mr. A. Henderson on the effect of alterations in the defence production programme on R.A.F. aircrew requirements, Mr. George Ward (Under-Secretary of State for Air) stated on December 19th that the number of aircrew required would be smaller than under earlier plans.

There was still a large requirement for Regular aircrew of the highest quality, he continued, and there were still openings for the best National Service candidates. But the number of National Servicemen accepted for aircrew training would be substantially reduced, and they would in future be trained as pilots only. The training of National Service aircrew at present in the R.A.F. would be limited: all suitable pilots would receive advanced flying training after the award of wings, but would continue to operational conversion units only if they were R.Aux.A.F. candidates.

The most important effect of this aircrew reduction, in turn, will be upon the flying training provided for the Service by civilian firms. In a further reply Mr. Ward stated that the seven schools set up for the basic training of National Service pilots and navigators would soon be closed, and new entries would be trained in Service schools in Flying Training Command. In addition, the grading or preliminary flight testing now carried out in two other civil schools would be transferred to Service schools. The basic flying schools affected are those at Ansty, Warwickshire (operated by A.S.T.); Booker, Bucks (Airwork); Derby (Air Schools); Desford, Leics (Reid and Sigrist); and Sywell, Northants (Brooklands Aviation). The basic air navigation schools are at Hamble, Hants (A.S.T.) and Usworth, Durham (Airwork); and the two grading schools are those of Airwork at Digby, Lincs, and Kirton-in-Lindsey, Lincs.

In addition to the defence cuts, another reason for the curtailment in training appears to be the disappointing proportion of National Servicemen, who, after aircrew training, have extended their service in the R.A.F. It has obviously been uneconomic to train large numbers of such men, who would be available for only brief periods with the squadrons before leaving the Service. National Servicemen have, of course, gone through exactly the same courses of flying training as regular R.A.F. aircrew, and numbers of them have been trained in Canada and Rhodesia, as well as at the British schools previously mentioned.

Giving further information on the limitation of re-engagement of Reserve aircrew, announced on November 27th, Mr. Ward stated that it had been decided to close down seven of the existing Reserve Flying Schools during the next six months. This reduction of Reserve re-engagement is in accord with the Air Ministry's view that the increasing tactical and technical complexity of operations must reduce the usefulness of pilots who have not had recent squadron operational experience.



"Flight" photograph

CUT: An A.S.T. Chipmunk comes in to land at Hamble. The Basic Air Navigation School for National Service aircrew—operated here by A.S.T.—is one of the schools that will close down, as reported above.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns; the names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

The F.E.2 Series

From A/Cdre. Sir Vernon Brown, C.B., O.B.E., R.A.F. (Retd.).

IN his excellent article in your December 12th issue, Mr. Bruce has erred in saying that the nearest approach to a real attack on a Zeppelin was on March 18th, 1918, when 2nd Lt. Morris and 2nd Lt. Lindford failed to achieve any visible result

In the spring or early summer of 1917, Lt Holder in a FE.2B shared with Lt. Saundby (now Sir Robert) in, I think, a D.H.2 the destruction of the Leiston Zeppelin. Both were stationed at Orfordness and the action took place in the early dawn. Each received the Military Cross.

London, W.C.1. VERNON BROWN.

THANK you for the most interesting series entitled " Historic Military Aircraft." With reference to the article on the F.E.2 series you may be interested to hear of an earlier attack on a German Zeppelin, an account of which appeared in the September 1951 issue of the *East Anglian Magazine*.

On the night of June 16th-17th, 1917, the L.48 (according to the article) was driven away from Harwich and engaged by anti-aircraft fire to the north of Felixstowe. An R.F.C. biplane took off from Orfordness Aerodrome, apparently without permission, and shot the Zeppelin down, where she crashed in flames near Theberton, in Suffolk.

The whole of the crew, sixteen in all, were killed, or died later, and were buried in the local churchyard.

There is some doubt as to on whom the credit should be placed for the destruction of the enemy raider as there were four different awards for bringing down a Zeppelin soon afterwards. A framed record of the incident, hanging in Theberton Church, claims that the L.48 was brought down by a pilot of No. 37 Squadron, R.F.C. After the wreckage had lain for two weeks the airship was dismantled by the R.N.A.S.

In a letter which appeared in a later issue of the *East Anglian Magazine* it was stated that the aircraft concerned was an F.E.2. It was the first one of its type to be made in Ipswich, at Ransomes, Sims and Jefferies Ltd. They have a drawing (which was reproduced) by Leonard R. Squirrell. The aircraft appears to be an F.E.2B without the small forward wheel and there are a pilot and observer in the cockpits. The serial number appears to be B.401.

Clacton-on-Sea, Essex. C. BROWN.

Was it the B.A.T.?

MAY I express my appreciation of your truly excellent new series of "historic military aircraft" articles and also of the new "Aircraft Intelligence" feature? Some more articles of historical nature like the recent "Light Fighters" would also be most welcome. In connection with this article Mr. Bruce's letter on page 680 of the November 28th issue of *Flight* recalled a forgotten incident to mind. In, as far as I can remember, late 1938 or early 1939 a flying film was being shown at the then Orpheum Cinema, Golders Green. As a schoolboy enthusiast I went to see this film, the title of which I unfortunately forget. However, on display in the cinema car park was a small radial-engined biplane. I believe that the colour was dark green overall. On the fuselage sides were the large letters B.A.T. in white, the full height of the tapering fuselage. As far as I can recall, the fuselage was of circular section, ply-covered. I gather that the machine may have been the B.A.T. Bantam. I know that I inquired at the cinema at the time for particulars but they apparently knew nothing of the history of the aircraft or its owner. The engine, I think I am right in saying, was a seven-cylinder radial and the wings were of parallel chord and were unstaggered. This description, from memory, seems to agree with illustrations which I possess but to which I have no access for the time being.

South Mimms, Herts. P. M. H. LEWIS.

Air Displays and the North

A COMPLAINT made by Lord De L'Isle and Dudley in a recent speech was of a shortage of recruits (15-17½) from the North and Midlands. May I, as a member of the Air Training Corps and a Northerner, suggest a remedy?

The Northern and Midlands public should be offered better attractions to the world of aviation. We should be taken into consideration when choosing the locality of the big air shows—S.B.A.C. Displays and R.A.F. reviews, for example. Such meetings could be held at, say, Leeds or Newcastle.

The Southerner has every opportunity to view, at Farnborough, the products of the S.B.A.C. and the equipment of the R.A.F. We in the North, unfortunately, have to make do with Battle of Britain displays which are usually far from encouraging to prospective members of the R.A.F.

Coronation year offers to the R.A.F. a golden opportunity to show the public its first line of defence. If there is to be a review, let us hope then that the organizers will take into consideration the above situation.

Middlesbrough. A.T.C.

[It was with this aspect in mind that the National Air Races and Display were held at Newcastle last summer. The S.S.A.F.A. likewise makes a point of holding its air displays at various provincial centres.—ED.]

Veteran Transports

THE very-well-informed letter by John Stroud in your issue of October 31st reminds me of another well-known old de Havilland aircraft, the D.H.6 G-EAUT, which was operated in 1920, and for many years after, by Blackpool Air Services, and was a familiar object to the pleasure flyers of those days around the North Wales, Lancashire, and Cumberland Coast. It operated from Blackpool, Morecambe and other seaside towns on charter, and when pleasure flying was undertaken during the holiday seasons.

In 1947 Blackpool Air Services was formed into the Air Navigation and Trading Co., Ltd., but the company still strongly upheld the pleasure-flying policy and it may be of interest to note that they still have in their fleet the only remaining D.H.84s on the British Register, G.ACIT and G-ADDI, which are in regular use and in condition that would do credit to many post-war aircraft.

These fine old Dragons are still a familiar sight to thousands of Blackpool holiday-makers, and they are equally familiar to the crofters on some of the remote islands of the Hebrides, where they operate on demand to carry trawler replacement crews from Fleetwood. Looking through the journey log-books of these aircraft recently I saw the names of several famous pilots who, I am sure, will remember the D.H.84 with more than a little affection. A.N.T. claim that there is no twin-engined replacement for the Dragon available in this country and that so long as airframe spares can be economically manufactured they will have work for the Dragons to do. It would be interesting to hear of other really old aircraft which are still doing public transport service.

Carlisle. ARTHUR DRINKWATER.

Feasible Flying Saucers

IN tracing the possible generic development of a flying saucer, we must first evaluate from observations of its flying characteristics. Capabilities include an ability to hover, to move forward, sideways or vertically upwards. There is only one type of aerodynamic design which possesses these characteristics—the helicopter/Autogiro type. The original Autogiro had blades which were free to rotate and acted as a moving aerofoil. The next step was to increase the efficiency of the lifting vanes—this was done in two ways, firstly by increasing the number of blades and, secondly, by applying power to the blades and thus increasing the speed. However, the size and shape of the blades depend on the power available from the engine. A limiting factor is also the speed of rotation of the blades. If the blade speed exceeds the speed of sound with orthodox aerofoil sections, the blades tend to "slip" in the air. However, if a supersonic section were used, the speed of rotation could be increased.

With the present-day helicopters we have a rotating wing above an orthodox fuselage. If we wish to turn a modern helicopter we have to swing the fuselage by means of a servo propeller so that the fuselage will proceed axially along the line of flight. This requires a time-lag—as to proceed in a direction at right angles to the axis of the fuselage would be impracticable, due to high profile-drag—unless the craft presented the same profile from any point at right angles to its vertical axis.

The present layout of the helicopter is analogous to the early days of orthodox aircraft, i.e., the positioning of wings on struts above and away from the fuselage. The closest analogy is a parasol-wing aircraft. The trend has been a low-wing monoplane with adequate streamlining.

If we now bring these conclusions forward to visualize the possible trend of future development and also postulate a source

CORRESPONDENCE . . .

of power much greater than at present in use, possibly an atomic converter to electrical energy, we could suggest the following possibilities :—

(1) Given unlimited power potential we can increase the number of blades until the blades become a rotating ring with a supersonic section.
(2) Control would be effected by altering the angle of attack of the wing.
(3) The rotating ring would be the annulus round a fuselage which would present the same profile from any position in a plane at right angles to its vertical axis.
(4) To prevent the fuselage from spinning, an anti-torque gyro must be fitted below the cupola. If an atomic plant is used, a good position for the installation would be below the gyro, as this would be some distance from the crew and be shielded by the gyro.
(5) If an atomic-energy power plant was used, the energy could be converted with a straight conversion to electrical energy and a relatively silent motor could be used—possibly some device using electromagnetism to create an increasing magnetic potential round a ring, then falling to zero and beginning again. This would impart rotation to the annulus.

Enough has possibly been said to show that a "flying saucer" layout would possess the flying characteristics ascribed to it in popular reports.

Luton, Beds. P. A. EABRY STEWART.

In Favour of Airships

IT has been rumoured recently in the Press that the Germans have completed plans for building a new Zeppelin. Although it is fashionable to decry the airship as a means of transport a strong case for static lift can be made out, especially when large loads are considered. Although the airship will never be able to compete with the aeroplane in speed it may yet prove to be its complement for the carriage of air freight and may also draw those travellers who desire swifter and smoother transport than can be provided by the largest liner. The liner, for all her luxury, remains subject to the ocean swell. The airship could also offer more comfortable, cheaper and, basically, safer flying than is obtainable in the aeroplane.

The pre-war airship was unnecessarily slow, due to underpowering and for this reason was too much at the mercy of adverse winds. Higher speeds, it is true, will call for a stronger structure with a stressed-metal skin in place of the traditional fabric cover, but even so, it should prove possible in a ship of the same gas capacity as the *Hindenburg* (7,000,000 cu ft) to provide an adequate strength factor within half of the gross lift (212 tons) for the ship complete with engines and all gear and fittings.

Assuming a power installation of four compound engines such as the Nomad (a quadrupling of the pre-war power), would it be unreasonable to expect at least double the speed, or 150 knots? One may guess that the total fuel consumption when cruising at this speed would be not more than one and a quarter tons per hour. On a flight from London to New York, a distance of some 3,000-odd nautical miles, the weight analysis would work out somewhat as follows :—

	tons
Weight of airship complete	106
Weight of fuel and lubricating oil, allowing one-third reserve	30
Weight of crew, say, 80 (including cooks and stewards) at 10 to the ton	8
Weight of food and drink for all on board	2
Payload (e.g.):—	
240 passengers with baggage at 8 to the ton	30
Freight and mail	36
Total	212

Ballast has deliberately been omitted from these calculations. There appears to be little point in wasting payload by initially carting around tons of water ballast when the ship can perfectly well be trimmed by pumping fuel from one end to the other. Further, if a reasonable time of day is chosen for starting the flight the tendency will be for the ship to become "light" owing to the superheating of the gas, rather than "heavy"—the only condition which might call for a release of ballast.

The adverse wind on the east-to-west flight would be roughly compensated by the difference in time between G.M.T. and American time. Commencing the flight in the early afternoon the ship should reach New York before the beginning of the working day on the morning following.

Greater speeds appear to confer little practical benefit, since sleep is a necessity for all men. If a passenger travels by night in a chair in a fast aeroplane his capacity for business the following day is unlikely to be high. If he does the same by day, he loses that day in any case, and is no better off than he would have been had he flown in the more spacious comfort of the airship, in which he would have a cabin and a comfortable sleeping berth and possibly even a hot bath in the morning, derived from the plant for recovering water from the engine exhaust gases!

The danger of fire must, however, be overcome. To this problem there are three lines of approach, firstly the hope of discovering some form of inhibitor which will suppress the high affinity of hydrogen for oxygen; secondly, the insulation of the hydrogen from the air by a jacket of inert gas, not necessarily itself buoyant; and, thirdly, the use of helium, whose disadvantages are its cost, rarity and greater weight than hydrogen.

The only nation with experience of the economics of commercial airship operation is Germany and it may be that, as the construction of heavier-than-air aircraft is forbidden to her, it may prove to the benefit of all if she were permitted to develop this other form of air transport which has no direct military value and will otherwise inevitably be lost to mankind.

Southsea, Hants. BLIMP.

FORTHCOMING EVENTS

Jan. 3. British Interplanetary Society: "Planetary Engineering," by E. Hope-Jones, M.A.(Cantab.), F.R.A.S., A.M.I.Mun.E.: "Landing on Airless Planets," by R. A. Smith.
Jan. 10. British Interplanetary Society (Birmingham): "Physiology of Interplanetary Travel," by C. R. Armstrong, B.Sc.
Jan. 15. R.Ae.C.: Film Show.
Jan. 16. Institute of Navigation: "Radar and Ice," by L. S. Le Page and A. L. P. Milwright.
Jan. 17. Aircraft Recognition Society: Sixth All-England Recognition Contest.
Jan. 17. British Interplanetary Society (Manchester): "Cosmic Radiation, its Intensity and Biological Effects." Lecturer to be announced.
Jan. 22. R.Ae.C.: Talk by William Courtenay, O.B.E., M.M.: "The Pacific Islands Campaign."
Jan. 27. Plymouth Aircraft Recognition Society: Meeting.
Jan. 28. R.Ae.C.: British Air Racing Championship Dinner.
Jan. 29. R.Ae.S.: "Titanium," by Maj. P. Litherland Teed, F.R.Ae.S., M.Inst.Met., M.I.M.M.
Jan. 29. R.Ae.C.: Film: "Colour Movies of the Pacific War," by William Courtenay, O.B.E., M.M.
Jan. 30. Junior Institution of Engineers: "Metal Spinning," by R. E. Baskerville.
Jan. 31. S.L.A.E.: Lecture (to be announced).
Jan. 31. Closing date for England-Christchurch (N.Z.) Race Entries.
Feb. 7. Helicopter Association: Discussion on Standards of Maintenance, and Requirements for Helicopter Engineers' Licences. Papers by Members of the A.R.B. and S.L.A.E.
Feb. 7. British Interplanetary Society: "Limiting Performance of Rocket Motors," by W. N. Neat, B.A., A.F.R.Ae.S.
Feb. 9. Institute of Transport: Brancker Memorial Lecture: "The Influence of Military Aviation on Civil Air Transport," by Sir Frederick Handley Page, C.B.E.
Feb. 11. British Institution of Radio Engineers: "Modern Trends in Communications Materials," by L. A. Thomas, B.Sc.
Feb. 14. British Interplanetary Society (Birmingham): "Rocket Test-bed Instrumentation," by J. Venn, B.Sc.
Feb. 17. R.Ae.S. Section Lecture: "Recent Developments in Gliding," by A. H. Yates.
Feb. 18. Aircraft Recognition Society: Meeting: Guest Speaker, Peter G. Masefield, M.A.(Eng.), F.R.Ae.S.
Feb. 20. Institute of Navigation: "Navigation and the Operation of Jet Aircraft," by Capt. R. C. Alabaster, D.S.O., D.F.C.
Feb. 21. British Interplanetary Society (Manchester): "Structural Problems of the Lunar Base," by P. L. Sowerby.
Feb. 25. R.Ae.C.: Britannia Trophy Dinner.
Feb. 26. R.Ae.S.: "New Materials and Methods for Aircraft Structure," by H. J. Pollard, Wh. Ex., F.R.Ae.S.
Feb. 28. S.L.A.E.: "Aircraft Fire-protection Equipment," by R. W. J. Cockram, A.M.I.E.E., A.I.Mech.E.
Mar. 6. Helicopter Association: Discussion on Flight-testing Experiences: contributions by C. T. D. Hosegood, S/L. W. R. Gellatly and Capt. J. A. Cameron.
Mar. 7. British Interplanetary Society: "Fabrication of the Orbital Space-vehicle," by K. W. Gatland, A. M. Kunesch and A. E. Dixon.
Mar. 14. British Interplanetary Society (Birmingham): "Artificial Satellites," by H. E. Ross.
Mar. 14. The Cranfield Society: A.G.M. and Dinner.
Mar. 18. Aircraft Recognition Society: Meeting: Guest Speaker, Prof. A. A. Hall, M.A., F.R.Ae.S.
Mar. 19. R.Ae.S.: Sixth Louis Blériot Lecture: "Making Commercial Aircraft Pay," by General Guy du Merle.
Mar. 21. British Interplanetary Society (Manchester): "Establishment of a Lunar Base," by R. A. Smith.
Mar. 24-26. Institute of Metals: Annual General Meeting and (Mar. 25) All-day Symposium on "Control of Quality in the Production of Wrought Non-ferrous Metals."
Mar. 27. R.Ae.S.: Full-day Discussion on "Fatigue" (postponed from Dec. 18).
Apr. 15. Aircraft Recognition Society: Annual General Meeting.
May 16. Wolverhampton Aero Club: Goodyear Trophy Race and Display.
May 25. S.S.A.F.A.: Display, Yeadon.
May 29. R.Aux.A.F.: Officers' Coronation Ball, London.
June 20. Southend Corporation and R.Ae.C.: National Air Races, Southend Airport.
June 26-July 5 Paris Aero Show.
June 27-29 R.Ae.C.: Members' La Baule Rally.
July 4-6. R.Ae.C.: Members' Deauville Rally.
July 15. Royal Air Force Coronation Review.
Sept. 6. S.M.A.E.: "Yorkshire Evening News" Model Flying Festival, Sherburn-in-Elmet.
Sept. 7-13. S.B.A.C.: Farnborough Display and Exhibition.
Oct. 8. Start of England-Christchurch (N.Z.) Air Race.

THE INDUSTRY

Westland Director Retires

FROM Westland Aircraft, Ltd., it is learned that Mr. Arthur Davenport, F.R.Ae.S., has retired from the company's board after a long and continuous association with the Yeovil factory.

In 1915 he was transferred by Petters, Ltd., from the oil engine side to the new aircraft division, which later became Westland Aircraft. In 1919 he was appointed chief designer and in 1944 technical director.

During his long and distinguished career Mr. Davenport has been associated with well-known civil and military types such as the Widgeon, Wapiti, Autogiro, Lysander, Whirlwind, Welkin, Wyvern and helicopters.

Mr. Davenport, who is now 61 years of age, does not propose entirely to sever his connection with Westland Aircraft; he plans to continue as a consultant to the company.

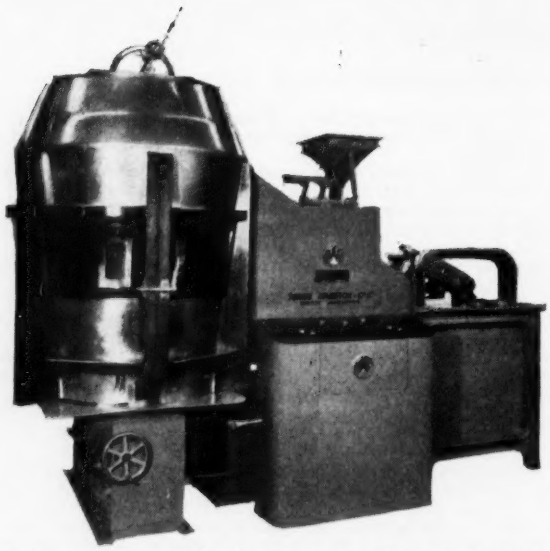
Pre-forming Fibreglass Plastics

THE use of glass fibre as reinforcement for plastic mouldings is no more than seven or eight years old, but in that time the technique has been accorded considerable priority in its development. Glass fibre is generally agreed to be the most efficient reinforcing material that has yet been commercially used for this purpose; it affords excellent mechanical properties to the finished moulding and has hardly any disadvantages. The fibre can be introduced in the form of unwoven yarn, as a chopped mat, or as woven Fibreglass cloth. Although the yarn is cheaper than the other two forms, it cannot be readily used in a moulding of complex shape; the glass-cloth, although having excellent properties and conferring a smooth and uniform finish to the moulding, is, unfortunately, relatively expensive.

A demonstration was recently given by Ashdowns, Ltd., of St. Helens, Lancs, of the use of chopped mat, which aims at obtaining the best of both worlds. The technique is as follows. Fibreglass yarn is cut into uniform lengths of about 2in, which are then deposited evenly (although with a random orientation) upon a metal grid having the approximate shape of the final moulding. This deposition is carried out in a Turner Atherton machine, in which the chopped mat is attracted to the metal grid by suction. The cycle is electrically controlled and a very uniform deposition thickness is obtainable.

On completion of the cycle, suction is removed and the "preform" is sprayed with a binding emulsion and baked. The preform is then placed in a press, where it is moulded to the finished dimensions with the required amount of polyester resin, inorganic filler and pigment. The finish of the resulting moulding is of a lower standard than that obtained with woven-fibre reinforcement or with no reinforcement at all; but very high mechanical strength is obtained at an extremely competitive production cost. The process is eminently suitable for the mass-production of intricate shapes to close tolerances, and the material withstands heavy blows without deformation, and exceptional impacts merely cause local crazing which can be perfectly repaired by the application of a little resin.

Although the Turner Atherton machine has been in use only a very short time, it appears likely to have considerable significance in the manufacture of reinforced mouldings for the aircraft industry. Complex section ducting, radomes and suppressed aerials on aerofoil sections immediately come to mind in this connection.



The Turner Atherton machine (see "Pre-forming Fibreglass Plastics").

LONG SERVICE by members of Simmonds Aerocessories, Ltd., was rewarded by presentations made recently before a large audience in the works canteen at Treforest, South Wales. Here Mr. L. G. Oxford (joint managing director), right, is seen handing a "15-year" award to Mr. R. Betty. In all, 500 awards were given, for periods up to 15 years.

Lucas Progress

SPEAKING at the recent annual general meeting of Joseph Lucas (Industries), Ltd., Mr. A. B. Waring, the chairman, said that there had been a very substantial increase in the demand for electrical and mechanical control devices for aircraft and gas turbines. Lucas had designed and supplied equipment for most of the new military aircraft.

In addition to equipment for such aircraft, the company was supplying specially developed equipment for gas-turbine-engined civil aircraft, including the Comet, the Viscount, and the Britannia. As was well known, these aircraft had opened up an entirely new era in civil aviation, and their export potential was most heartening. The increasing traffic carried by airlines showed no sign of diminution in its rate of growth, and for this reason the company looked with considerable satisfaction on all business obtained for the supply of equipment for civil aircraft.

British Standard for Pren Cables

IN a recent paragraph on this page referring to the publication of British Standard E.21, *Electric Cables for Aircraft (Glass and Polychloroprene Insulated)*, a note was added to the effect that Pren cables are made by British Insulated Callenders Cables, Ltd.

We now learn from Mr. D. B. McKenzie, chairman of B.S.I. Committee ACE/6, Aircraft Cables, that "Pren" is not in fact a registered trade name, but an M.o.S. designation, and that the undermentioned firms also manufacture cables of this type:—

Craigpark Electric Cable Co., Ltd.; W. T. Henley's Telegraph Works Co., Ltd., Johnson and Phillips, Ltd.; Liverpool Electric Cable Co., Ltd.; Pirelli-General Cable Works, Ltd.; Rists' Wires and Cables, Ltd.; Siemens Bros. and Co., Ltd.; and St. Helens Cable and Rubber Co., Ltd.

IN BRIEF

The London office of Thos. Firth and John Brown, Ltd., is now at 11 Hamilton Place, Piccadilly, W.1 (Grosvenor 8781).

* * *

A new bulletin issued by Sharples Centrifuges, Ltd., Woodchester, Stroud, Glos., and dealing with the company's range of laboratory centrifuges, uses functional-colour illustrations to explain the operation of the various types.

* * *

A brochure from Kent Alloys, Ltd., Temple Manor Works, Rochester, Kent, gives illustrated examples and data on the wide variety of castings which the company produces. Materials include aluminium, magnesium alloys, Elektron magnesium-zirconium alloys, cast iron, and copper and zinc alloys.

* * *

A range of "Harrisflex" stud-type anti-vibration mountings specially designed for use in scientific instruments and light machinery is illustrated in a new leaflet from Howard Clayton-Wright, Ltd., Wellesbourne, Warwickshire. Basically of rubber bonded to metal, the mountings can be loaded in any plane and in any combination of torsion, shear, compression or tension.

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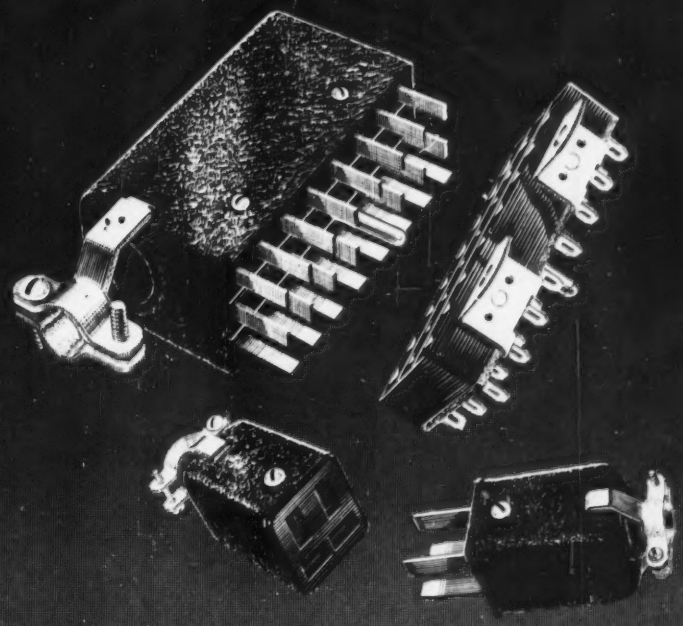

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Postal Orders and cheques sent in payment for advertisements should be made payable to Iliffe & Sons, Ltd., and crossed & Co.

Trade Advertisers who use these columns regularly are allowed a discount of 5% for 13, 10% for 26 and 15% for 52 consecutive insertion orders. Full particulars will be sent on application.

Box Numbers. For the convenience of private advertisers Box Number facilities are available at an additional charge for 2 words plus 1/- extra to defray the cost of registration and postage, which must be added to the advertisement charge. Replies should be addressed to "Box 0000, c/o Flight," Dorset House, Stamford Street, London, S.E.1.

The Publishers retain the right to refuse or withdraw advertisements at their discretion and do not accept liability for delay in publication or for clerical or printer's errors although every care is taken to avoid mistakes.

Situations Vacant. The engagement of persons answering these advertisements must be made through the local office of the Ministry of Labour and National Service etc. if the applicant is a man aged 18-64 or a woman aged 18-59 inclusive, unless he or she or the employer is excepted from the provisions of The Notification of Vacancies Order 1952.

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£7,500 D.H. FLAMINGO 17-passenger all-metal monoplane. Fully modified. Year's Certificate Airworthiness. Price includes two newly overhauled spare engines. This plane is in perfect order and ample spares are available. Fitted automatic pilot, hydromatic propellers and extremely complete radio aids. The Flamingo is one of the world's most advanced transport aircraft—cruising speed 170 m.p.h. on 29 gallons per engine per hour. Stalling speed flaps down 60 m.p.h. Take-off 320 yards in 5 m.p.h. wind at full load.

£1,295 SLINGSBY SKY. The world's most famous sailplane. This is the actual SKY which, flown by Philip Wills, won first place in the 1952 International Gliding Championships in Madrid. 12 months Certificate Airworthiness by the makers. Finished in high gloss blue and cream cellulose enamel and equipped with full instrument panel. Stowage provided for oxygen and radio equipment.

£150 MOSSCRAFT MA.II 2-seat enclosed monoplane. Cirrus Minor engine. This beautiful little aeroplane is the property of Mosscraft, Ltd., the designers and manufacturers, and is of course, in perfect condition. Current Certificate Airworthiness. Total hours since new under 120. The engine alone is worth the money—why do we give aeroplanes away?

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AIR TRANSPORT ADVISORY COUNCIL

THE Air Transport Advisory Council give notice that they have received the undermentioned applications to operate scheduled air services:—

FROM Silver City Airways Ltd., of 1 Great Cumberland Place, London W.1.

Application No. 130 for a Vehicle Ferry Service, initially with Bristol 170 aircraft and later with Blackburn Universal aircraft for the carriage of vehicles, supplementary passengers and supplementary freight between Southend or Lympne and Ostend (Middelkerke) at a frequency of from up to two services daily in winter and from two to twelve services daily in summer during the period from April 1st, 1953, to December 31st, 1961.

FROM Lancashire Aircraft Corporation Ltd., of Samlesbury Airfield, near Blackburn, Lancashire.

Application No. 131 for a U.K. Internal Service, with Airspeed Consul, DH86, DH89 and Dakota aircraft, for the carriage of passengers, supplementary freight and mail between Blackpool (Squires Gate) and Isle of Man (Ronaldsway), at a frequency of up to ten services daily (twelve services on Fridays, Saturdays and Sundays during summer season), during the period from January 1st, 1953, to December 31st, 1959.

Application No. 132 for a U.K. Internal Seasonal Service with Airspeed Consul, DH86, DH89 and Dakota aircraft, for the carriage of passengers, supplementary freight and mail between Leeds (Yeadon) and Isle of Man (Ronaldsway) with an intermediate traffic stop at Blackpool (if required) at a frequency of up to six services on Fridays, Saturdays and Sundays, increasing up to eight services daily if traffic demands during the period from May 1st, 1953, to September 30th, 1959.

Application No. 133 for a U.K. Internal Seasonal Service with Airspeed Consul, DH86, DH89 and Dakota aircraft, for the carriage of passengers, supplementary freight and mail between Isle of Man (Ronaldsway) and Birmingham (Elmdon), at a frequency of from one to four services on Fridays, Saturdays and Sundays and up to two services daily during the period from June 1st, 1953, to September 30th, 1959.

Application No. 134 for a U.K. Internal Seasonal Service with Airspeed Consul, DH86, DH89 and Dakota aircraft, for the carriage of passengers, supplementary freight and mail between Leeds (Yeadon) and Jersey, Channel Islands, at a frequency of up to three services on Fridays, Saturdays and Sundays, increasing further in accordance with traffic demand during the period from June 1st, 1953, to September 30th, 1959.

Application No. 135 for a U.K. Internal Seasonal Service with Airspeed Consul, DH86, DH89 and Dakota aircraft, for the carriage of passengers, supplementary freight and mail between Blackpool (Squires Gate) and Jersey, Channel Islands, at a frequency of from one to two services on Fridays, Saturdays and Sundays, during the period from June 1st, 1953, to September 30th, 1959.

THESE applications will be considered by the Council under the Terms of Reference issued to them by the Minister of Civil Aviation on July 30th, 1952. Any representations or objections with regard to these applications must be made in writing, stating the reasons and must reach the Council within 14 days of the date of this advertisement, addressed to the Secretary, Air Transport Advisory Council, 9 Buckingham Gate, London S.W.1, from whom further details of the applications may be obtained. When an objection is made to an application by another air transport company on the grounds that they are applying to operate the route or part of route in question, their application, if not already submitted to the Council, must reach them within the period allowed for the making of representations or objections. [9074

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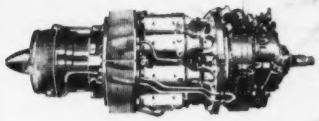

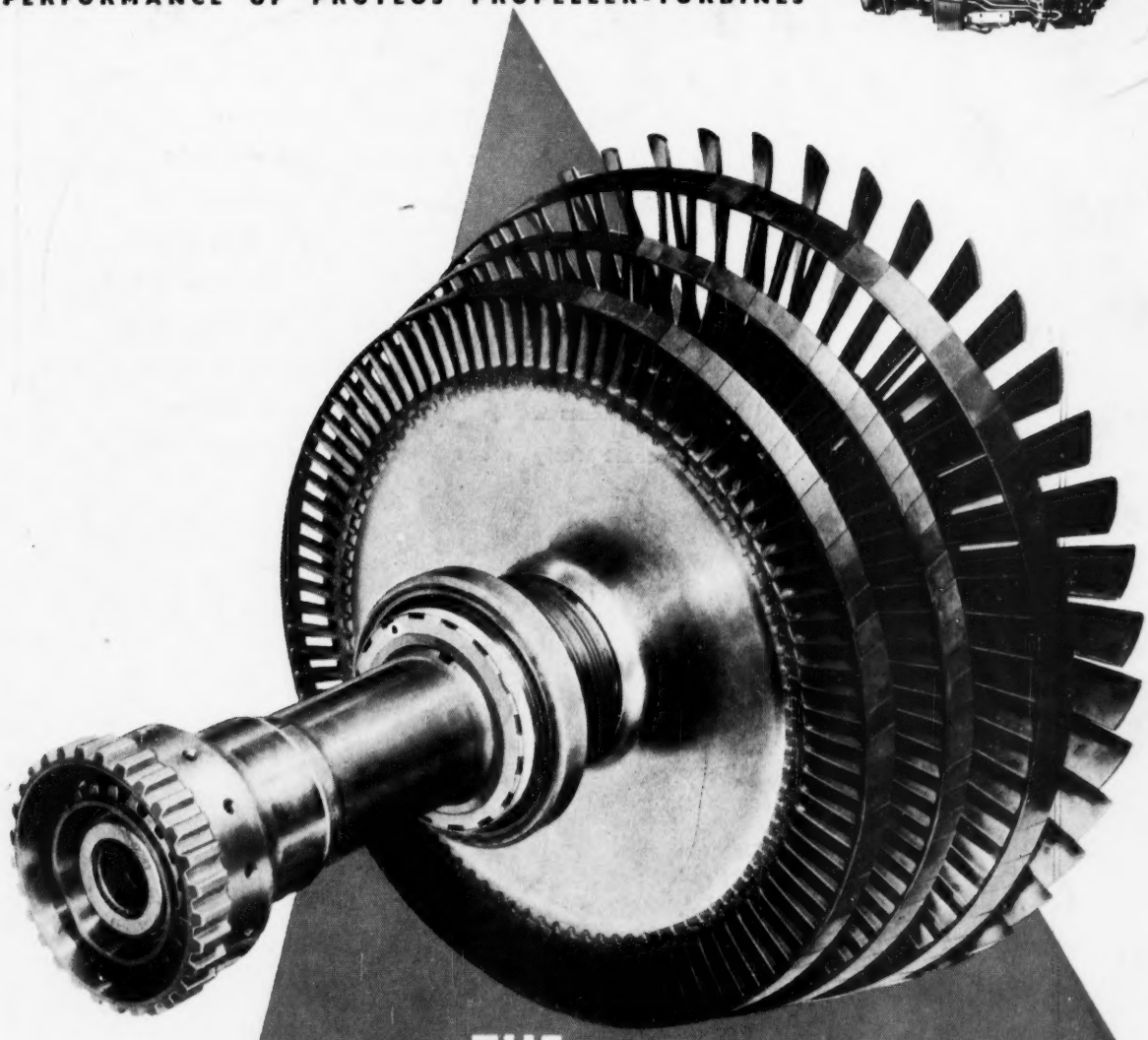

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